2023 Tennessee Annual Monitoring Network Plan

Tennessee Department of Environment and Conservation

Air Pollution Control Division

July 1, 2023

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Annual Air Monitoring Network Plan Acronym Glossary

AADT ..... Annual Average Daily Traffic
AMNP ..... Annual Monitoring Network Plan
AQI ..... Air Quality Index
AQS ..... Air Quality Subsystem
BAM ..... Beta Attenuation Monitor
CASTNET ..... Clean Air Status and Trends Network
CBSA ..... Core-Based Statistical Area
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
DAPC ..... Division of Air Pollution Control
DRR ..... Data Requirements Report
DV ..... Design Value
EFO ..... Environmental Field Office
EPA ..... Environmental Protection Agency
ERT ..... Environmental Response Trust
FEM ..... Federal Equivalent Method
FRM ..... Federal Reference Method
µg/m3 ..... Micro Grams per Cubic Meters
MSA ..... Metropolitan Statistical Area
NAAQS ..... National Ambient Air Quality Standards
NCO ..... Nashville Central Office
NCore ..... National Core Monitoring Station
NEI ..... National Emissions Inventory
NFO ..... Nashville Field Office
NPS ..... National Park Service
NO2 ..... Nitrogen Dioxide
NO_x ..... Nitrogen Oxides
NO_y ..... Reactive Oxides of Nitrogen
O_3 ..... Ozone
PAMS ..... Photochemical Assessment Monitoring Station
Pb ..... Lead
$PM_{2.5}$ ..... Particles with an average aerodynamic diameter of 2.5 microns or less
PM_{10} ..... Particles with an average aerodynamic diameter of 10 microns or less
PWEI ..... Population Weighted Emission Index
POC ..... Parameter Occurrence Code
ppb ..... Parts Per Billion
ppm ..... Parts Per Million
PQAO ..... Primary Quality Assurance Organization
PSD ..... Prevention of Significant Deterioration
SLAMS ..... State and Local Air Monitoring Stations
SO_2 ..... Sulfur Dioxide
SPM ..... Special Purpose Monitor
TEOM ..... Tapered Element Oscillating Microbalance
TDEC ..... Tennessee Department of Environment and Conservation
Tpy ..... Tons per year
TVA ..... Tennessee Valley Authority

Introduction to the 2023/24 Annual Monitoring Network Plan for Tennessee

The annual monitoring network plan (AMNP) that is presented in the following pages will address each of the requirements specified in the Code of Federal Regulations (CFR). An overview of the geography, general climate, wind patterns, and population trends is included to provide background information that will help the reader understand the current air monitoring network and the reasons for the placement of the existing monitoring sites. The actual regulatory requirements that specify the number and arrangement of air monitoring sites are found in 40 CFR 58. The sections that provide this guidance are also included in the report to help better understand the actual monitoring needs in each area.

In many instances, the areas for which monitoring is required are based on population criteria in which population must be considered to allow for monitoring in the areas where people may be affected or exposed to the various criteria pollutants of concern. Additional monitoring sites are needed to address impacts to communities where source-related emission density might be elevated. Other considerations must also be addressed when selecting and operating air monitoring sites. The local influences of some types of sources (roadway dust or emissions) may be factors that require monitoring sites to be spaced certain distances from those sources. In near-road or roadway monitoring activities, the monitors must be located very close to the potential sources of mobile emissions.

The USEPA defines environmental justice as *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."*

Entities can strive for evironmental justice through taking steps to ensure that everyone enjoys the same degree of protection from environmental and health hazards, and is provided equal access to the decision-making process to have a healthy environment in which to live, learn, and work. The Tennessee Department of Environment and Conservation (TDEC) promotes these environmental justice goals of equal protection and equal access for all Tennesseans.

The principal areas in Tennessee with air monitoring sites are depicted with a graphic showing each of the monitoring sites' locations. The sites are further identified with a site number, an Air Quality Site Identification (AQSID), and the types of pollutants being monitored at each location. Tables containing the relevant information for each site are also included. The tables are provided in two sections following the location graphic and can be found within each area's section of the report and relieve the reader from searching tables at the end of the report for information about a given site.

Each of the four local programs operating an air monitoring network in Tennessee provided a separate annual review. The local program's annual monitoring network plan will be submitted at the same time as the State of Tennessee's annual air monitoring network plan. Where revisions were noted in the local networks, those revisions were added to the State's overall plan.

The State of Tennessee is required to evaluate the ambient air monitoring network each year following requirements specified in 40 CFR Subpart B 58.10 and 40 CFR 58 Appendix D. All ambient air monitoring sites are meeting these regulatory requirements. Air monitoring site evaluations can be found in Appendix F. The National Park Service (NPS) operates several air monitoring sites located within the Great Smoky Mountains National Park (GSMNP). The National Park Service (NPS) is responsible for generating, reviewing, and validating the data generated by these monitoring sites. The Environmental Protection Agency (EPA) has determined that these sites fall under the Primary Quality Assurance Organization (PQAO) oversight of the NPS and, as such, are the responsibility of the NPS. As a courtesy, TDEC DAPC provides an overview of these sites in the Tennessee Annual Monitoring Network Plan.

Proposed Revisions to Tennessee's Ambient Air Monitoring Network

TDEC DAPC proposes no changes in the air monitoring network for 2023-24.

Special Projects

Tennessee Air Quality Sensor Evaluation

The Tennessee Department of Environment and Conservation-Division of Air Pollution Control (TDEC-DAPC) conducted a study on small sensor technologies for air quality characterization. The study tested $PM_{2.5}$ and gaseous sensors, finding high data recovery and no major sensor degradation after one year. PurpleAir $PM_{2.5}$ sensors showed good agreement with the $PM_{2.5}$ FEM monitor after data adjustments, suggesting potential for quantitative air quality applications. For more information on the results of the *TDEC-DAPC Air Quality Sensors Evaluation*, please visit our StoryMap.

TDEC-DAPC plans to continue sensor technology research and is currently utilizing an expanded network of PurpleAir sensors for increased $PM_{2.5}$ AQI coverage and collocation with regulatory PM monitors across the state. Data from our sensor network is available to the public on the PurpleAir website as well as AirNow's Fire & Smoke map.

The Purpose of Tennessee's Ambient Air Monitoring Network

There are several criteria used to determine the need for ambient air quality monitoring. These criteria are as follows:

- EPA National Ambient Air Quality Standards (NAAQS) criteria pollutants monitoring network requirements for the NCore, formally NAMS (National Air Monitoring Site); SLAMS (State and Local Air Monitoring Stations); and SPM (Special Purpose Monitoring) monitoring networks can be found in 40 CFR Appendix D to Part 58.
- The CFR sets forth regulations for air quality monitoring requirements implemented by the states and the EPA. These requirements are primarily organized around population and emission density in each area with the number of required monitors and the monitors' distribution within the networks specified by these regulations. Additionally, 40 CFR, Part 58, Appendix D specifies criteria for designing the NCore and SLAMS networks. The EPA must approve the design or modifications to these networks.
- Additional federal regulations also specify requirements for the Prevention of Significant Deterioration (PSD) monitoring networks. This monitoring requirement is triggered as part of a PSD permit application review. There is no representative contemporaneous ambient air quality data for the area near the proposed PSD source site. Under these criteria, either pre or post-construction monitoring may be required to be conducted in the area near the facility, likely to be impacted (as determined by modeling) by emissions.
- Air quality monitoring must be conducted to alert citizens in given areas to elevated air pollutants in cities or communities of designated population levels required to provide Air Quality Index (AQI) reports to the general public.
- Conducting air quality monitoring will address the need for background air quality data.
- Special air quality monitoring studies are conducted based on identified needs for monitoring data in each area.
- Citizen complaints and enforcement investigations related to air quality are other reasons for air quality monitoring, usually in or around a specific area related to the complaint or investigation.
- Where warranted, requests from citizens for special air monitoring studies are also reasons for air monitoring activities.
- The federal regulations also specify the frequency, method, location requirements, equipment, quality assurance procedures, and reporting of data collected from the ambient air monitoring networks.

Pollutant-specific requirements for establishing the need for ambient monitoring and the number of required monitors are found in Appendix D. Currently, all areas in Tennessee and Tennessee's CBSAs are fulfilling the requirements for operating each type of ambient monitor(s) as well as the requirements for reporting the AQI. This is being accomplished through a joint effort by the State of Tennessee and other agencies located within the state and its CBSAs.

The following sections detail how the various requirements found in 40 CFR Part 58 are being met and, when relevant, by which criteria pollutant monitors. Individual monitors listed may belong to the State of Tennessee or other agencies' operating monitors in the state and its multi-state CBSAs.

Air Quality Index Reporting

The following table demonstrates how Tennessee is meeting the minimum requirements for AQI reporting for particles with an average aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) and O_3 (ozone):

Metropolitan Statistical Area	2021 Census	2022 Census Est.	Required to Have AQI Reporting	Daily AQI/Air Quality Forecasts Provided
Chattanooga, TN-GA	567,454	574,507	Yes	Yes
Clarksville, TN-KY	329,094	336,605	No	Yes
Cleveland, TN	127,553	128,479	No	No
Jackson, TN	180,594	181,579	No	No
Johnson City, TN	207,252	210,256	No	Yes, based on the combined population of both areas.
Kingsport-Bristol-Bristol, TN-VA	308,794	311,272	No	
Knoxville, TN	893,262	907,968	Yes	Yes, in addition, the GSMNP has a separate AQI/Forecast provided.
Memphis, TN-MS-AR	1,335,407	1,332,305	Yes	Yes
Morristown, TN	143,785	146,172	No	Not specifically but is included in the Knoxville forecast.
Nashville-Davidson--Murfreesboro, TN	2,011,204	2,046,828	Yes	Yes

$PM_{2.5}$ Monitoring

The following table lists the currently active $PM_{2.5}$ SLAMS monitoring sites that fulfill the minimum $PM_{2.5}$ requirements found in 40 CFR Part 58, Appendix D for all MSAs in the state:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	1	13-295-0004[1,2]
		47-065-0031[3]
		47-065-4002[1]
Knoxville, TN CBSA# 28940	1	47-093-1013[1]
		47-093-1020
		47-093-1017[1]
		47-105-0109[1]
Memphis, TN-AR-MS CBSA# 32820	2	05-035-0005
		28-033-0002
		47-157-0024
		47-157-0075[1]
		47-157-0100[1]
Nashville, TN CBSA# 34980	2	47-037-0023[1]
		47-037-0040
		47-165-0007[1]

[1] Site operates a collocated FEM/FRM monitor

[2] Relocated site was formerly 13-295-0002

[3] The East Ridge site shutdown is approved for 2022-23

$PM_{2.5}$ Continuous Monitoring

The following table lists the currently active $PM_{2.5}$ monitoring sites that fulfill the minimum continuous $PM_{2.5}$ requirements found in 40 CFR Part 58, Appendix D for all MSAs in the state:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA # 16860	1	13-295-0004[1,2]
		47-065-4002[1]
Knoxville, TN CBSA # 28940	1	47-009-0011
		47-105-0004
		47-105-0109[1]
		47-093-1013[1]
		47-093-1017[1]
		47-093-1020
Memphis, TN-AR-MS CBSA # 32820	1	47-157-0100[1]
		28-033-0002
		47-157-0075[1]
		05-035-0005[1]
Nashville, TN CBSA # 34980	1	47-037-0023[1]
		47-037-0040
		47-119-2007
		47-165-0007[1]

[1] Site operates a collocated FEM/FRM monitor
[2] Relocated site was formerly 13-295-0002

PM2.5 Background and Transport Sites

The following sites meet the requirement for the State's operation of 1 background and 1 regional transport site:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Background	1	47-099-0003
Regional Transport	1	47-009-0101

PM_{10} Monitoring

PM_{10} monitoring is currently being conducted by Nashville's Metro Public Health Department of Davidson County, the Shelby County Health Department in Memphis, and the Knox County Health Department. The minimum requirements for PM_{10} monitoring are met by a combination of EPA waivers and by the following SLAMS sites:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	1	Waived
Knoxville, TN CBSA# 28940	1	47-093-1013[1]

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	2	47-157-0024
		47-157-0075
Nashville, TN CBSA# 34980	2	47-037-0023
		Waived

[1]Site operates a collocated FEM/FRM monitor

Ozone Monitoring

TDEC DAPC operates eight ozone monitoring sites. Information that is more detailed can be found in Appendix F. The following table outlines the monitors that satisfy the minimum number of ozone SLAMS monitors required by 40 CFR Part 58, Appendix D, Section 4.1 in each MSA:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	2	47-065-1011
		47-065-4003
Clarksville, TN-KY CBSA# 17300	1	21-047-0006
Kingsport-Bristol-Bristol, TN-VA CBSA# 28700	1	47-163-2002
		47-163-2003
Knoxville, TN CBSA# 28940	2	47-001-0101
		47-009-0101
		47-009-0102
		47-093-0021
		47-093-1020
		47-105-0109
Morristown, TN CBSA# 34100	1	47-089-0002
Memphis, TN-AR-MS CBSA# 32820	2	05-035-0005
		28-033-0002
		47-157-0021
		47-157-0075
		47-157-1004
Nashville, TN CBSA# 34980	2	47-037-0011
		47-037-0026
		47-165-0007
		47-187-0106
		47-189-0103

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Sevierville, TN CBSA# 42940	1	47-155-0101[1]
		47-155-0102[1]

[1]Site operated by the National Park Service

Carbon Monoxide (CO) Monitoring

The requirement for CO SLAMS near-road monitoring is met in the Nashville CBSA by the CO monitor operating at the near-road site and in the Memphis, TN-AR-MS CBSA as outlined below:

Metropolitan Statistical Area	Required Number of Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	47-157-0100
Nashville, TN CBSA# 34980	1	47-037-0040

Nitrogen Dioxide (NO_2) Monitoring

NO_2 SLAMS monitoring requirements for operating near-road monitors are met for both the Nashville and the Memphis, TN-AR-MS CBSAs, as detailed below:

Metropolitan Statistical Area	Required Number of Near-Road Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	47-157-0100
Nashville, TN CBSA# 34980	1	47-037-0040

Area-wide NO_2 monitoring is also met in the same CBSAs, where the State of Arkansas operates the area-wide NO_2 monitor to satisfy the requirements for the Memphis, TN-AR-MS requirement. This site is operated as agreed to in a memorandum of agreement between Memphis and the states of Arkansas and Mississippi; the required sites are listed below:

Metropolitan Statistical Area	Required Number of Area-Wide Monitors	Monitors (AQSID)
Memphis, TN-AR-MS CBSA# 32820	1	05-035-0005
Nashville, TN CBSA# 34980	1	47-037-0011

SO_2 Monitors

The minimum number of SO_2 monitors is determined by calculating the population weighted emissions index (PWEI) for each CBSA as defined in 40 CFR Part 58, Appendix D, Section 4.4 and detailed in Table 5. The following monitors satisfy the PWEI requirements for all CBSAs in the state:

Metropolitan Statistical Area	Required Number of PWEI Monitors	Monitors (AQSID)
Kingsport-Bristol-Bristol, TN-VA CBSA# 28700	1[1]	47-163-6001
Memphis, TN-AR-MS CBSA# 32820	0	47-157-0075
Nashville, TN CBSA# 34980	0	47-037-0040

[1]PWEI monitor is required by the Regional Administrator (RA) not by the calculated PWEI

The Regional Administrator may require additional monitoring stations per 40 CFR Part 58, Appendix D Sec. 4.4.3. These additional monitors may be required in areas that have the potential to violate or contribute to the violation of the NAAQS, in areas not suitable for modeling, or in areas with susceptible and vulnerable populations, which are not monitored under the PWEI requirements.

The Region 4 Administrator has required the State to operate an enhanced SO_2 monitoring network of 1 PWEI site and 3 additional sites within the 2010 1-hr SO_2 NAAQS nonattainment area in the Kingsport-Bristol-Bristol, TN-VA CBSA.

Metropolitan Statistical Area	Required Number of RA Monitors	Monitors (AQSID)
Kingsport-Bristol-Bristol, TN-VA CBSA# 28700	3	47-163-6002
		47-163-6003
		47-163-6004

Lead (Pb) Monitoring:

The State operates a single lead monitoring site in Sullivan County, Tennessee near the currently shutdown Exide facility. This site is located within the boundary of the current Bristol lead maintenance area. The State is also required to operate a source-oriented lead sampler at the Commercial Metals Company (CMC) Steel US plant, formally Gerdau in Knoxville. This monitoring is being conducted by the Knox County Health Department. The requirements for lead sampling are met by the following sites:

Source	Required Number of Monitors	Monitors (AQSID)
Exide, Sullivan County	1	47-163-3004[1]
CMC Steel Plant, Knox County	1	47-093-0023[2]
		47-093-0024[3]

[1]Site operates a collocated monitor
[2]Site redesignation from SPM to SLAMS requested
[3]Site shutdown requested

National Core Monitoring Station

In October 2006, the United States EPA established the National Core (NCore) multi-pollutant monitoring network in its final amendments to the ambient air monitoring regulations for criteria pollutants (codified in 40 CFR parts 53 and 58). It is the expectation that each state will have at least one NCore site. Nationwide, approximately 50 sites

will be in urban locations and 20 sites in rural areas. The multi-pollutant monitoring approach at NCore sites will benefit health assessments, emissions strategy development, and future monitoring efforts. By providing data users, such as researchers and policymakers, with a robust suite of collocated pollutant and meteorological data, NCore sites will better characterize the numerous chemical and physical interactions between pollutants than what is traditionally available at compliance-oriented monitoring sites. Shelby County operates the only required NCore site in Tennessee. The Shelby County AMNP details this site. The Look Rock rural NCore site is an optional site operated by NPS.

Near-Road Monitors:

There are currently two near-road sites in Tennessee and operated in local program counties (Davidson and Shelby). The near-road monitoring network was initiated as part of the 2010 NO_2 NAAQS review and has become a multi-pollutant (CO, NO_2, NO, NO_x, $PM_{2.5}$) monitoring network. In cooperation with state, local, and tribal air agencies, the EPA has tracked the installation of near-road NO2 monitoring stations across the country. As part of this effort, the EPA has created a list of sites and captured critical meta-data about their target roads and general operations. Additional information on near-road monitoring networks can be found at https://www.epa.gov/amtic/no2-monitoring-near-road-monitoring and in Monitoring Network Requirements.

Prevention of Significant Deterioration (PSD) monitoring:

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act preconstruction review program for new and modified major stationary sources of air pollution (e.g., power plants, manufacturing facilities). The program requires that the area where the source is located be classified as either in attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS). The NAAQS establishes maximum pollution concentration levels to protect public health and welfare from harmful levels of nitrogen oxides, ozone, sulfur dioxide, particulates, carbon monoxide, and lead. A PSD increment is the maximum allowable increase in concentration towards the NAAQS from the baseline concentration for a pollutant. The baseline concentration is set for each existing pollutant at the time that the first complete PSD permit application affecting the area is submitted. PSD increments prevent the air quality in clean areas from completely consuming remaining air quality to the level set by the NAAQS. This monitoring requirement is triggered when there is insufficient ambient air quality data necessary to determine compliance with the NAAQS. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility being constructed.

Currently, TDEC DAPC does not operate any PSD monitors.

Clean Air Status and Trends Network (CASTNET)

The Clean Air Status and Trends Network (CASTNET) monitoring network is designed to measure air quality in rural areas year-round. CASTNET sites in Tennessee and the state's metropolitan statistical areas (MSAs) are managed by the EPA's Clean Air Markets Division and operated by an EPA contractor. There are four CASTNET sites in rural areas of Tennessee and Kentucky. The three CASTNET sites in Tennessee are as follows:

Table 1: CASTNET Sites in Tennessee Areas

Site	AQSID	County	Location	2020 to 2022 Ozone DV (ppm)
Edgar Evins (ESP127)	47-041-9991	DeKalb	Edgar Evins State Park, Smithville, TN 37166	0.057
Speedwell (SPD111)	47-025-9991	Claiborne	718 Russell Hill Rd, Speedwell, TN 37870	0.056
Look Rock (GRS420)	47-009-0101	Blount	Great Smoky Mountains National Park	0.063

$PM_{2.5}$ Chemical Speciation Network (CSN)

The $PM_{2.5}$ Chemical Speciation Network is operated in accordance with 40 CFR Part 58, Appendix D Sec 4.7.4, where the requirement for CSN monitors is as follows:

> Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). The selection and modification of these STN sites must be approved by the Administrator. The PM 2.5 chemical speciation urban trends sites shall include analysis for elements, selected anions and cations, and carbon.

The EPA currently funds three CSN sites in Tennessee's CBSAs:

Metropolitan Statistical Area	CSN Monitors (AQSID)
Chattanooga, TN-GA CBSA# 16860	13-295-0004[1]
Knoxville, TN CBSA# 28940	47-093-1017[2]
Memphis, TN-AR-MS CBSA# 32820	47-157-0075

[1]Relocated site was formerly 47-295-0002
[2]Relocated site was formerly 47-093-1020

Photochemical Assessment Monitoring Station (PAMS)

The EPA's PAMS program began in the 1990s and was revised during the 2015 ozone NAAQS review. These revisions called for ozone precursor monitoring to be conducted during peak months (June-August) at NCore sites in CBSA's with populations ≥ 1 million. The number of required PAMS sites in the US was lowered from 75 to 43, with 16 of those being new PAMS sites. The NCore site in the Memphis CBSA (47-157-0075) is one of the required new PAMS sites. To meet the requirements in the regulations promulgated in October 2015, all PAMS Required Sites were to be operational and reporting quality assured and validated data for the required parameters to the EPA's Air Quality System by June 1, 2019. Due to a number of issues related to the startup of PAMS, the new start date was postponed to June 1, 2021.

Monitoring Sites and Discussion

All TDEC DAPC-operated sites meet the siting criteria as found in Appendix E to 40 CFR Part 58 for probe and monitoring path for $PM_{2.5}$, O_3, Pb, and SO_2. These sites will be reevaluated annually for compliance with this criterion. These sites are part of the State of Tennessee ambient air monitoring criteria pollutant monitoring network and are operated to ensure continued compliance with Appendix D to 40 CFR Part 58 network design requirements. Current site evaluations with photographs, distance measurements and confirmation of meeting the siting criteria requirements are provided in Appendix F to this plan.

The individual monitoring sites below have graphs included of their daily measured parameters, displayed according to their respective daily design value statistic when applicable. Sites that have changed $PM_{2.5}$ monitoring methods are depicted together. They are displayed according to their new and historical parameter occurrence code (POC). For $PM_{2.5}$ federal reference monitors (FRMs), POCs 1 and 2 are used and for federal equivalent $PM_{2.5}$ monitors (FEMs), POCs 3 and 4 are used.

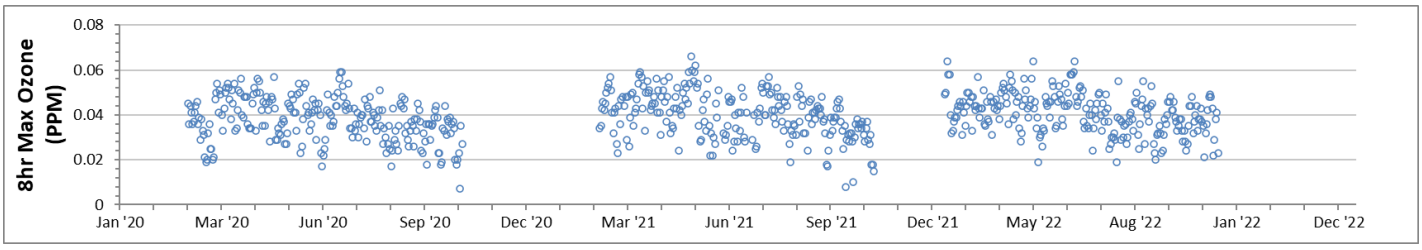
Freels Bend – Anderson County

Address	Freels Bend Study Area Melton Lake Oak Ridge
AQSID	47-001-0101
CBSA	28940
Lat, Lon	35.965504, -84.22319
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Freels Bend site is in Anderson County, Tennessee and currently supports ambient air monitoring for ozone. The Freels Bend site was initially established in 1992 and is located west of Knoxville and southeast of Oak Ridge, Tennessee. This site is an upwind site from the core Knoxville MSA. This site serves in assessing upwind ozone levels entering the Knoxville area. This site was determined to remain in operation over five years (2023 through 2027). The Knoxville MSA has six ozone sites and is required to have only two. This site is also employed in the air quality index (AQI) forecasting program and currently is attaining the standards for ozone.

This site previously monitored for SO_2 in addition to ozone but due to changes in SO_2 monitoring requirements, TDEC DAPC ended SO_2 monitoring on December 31, 2019.

Freels Bend Daily Air Quality

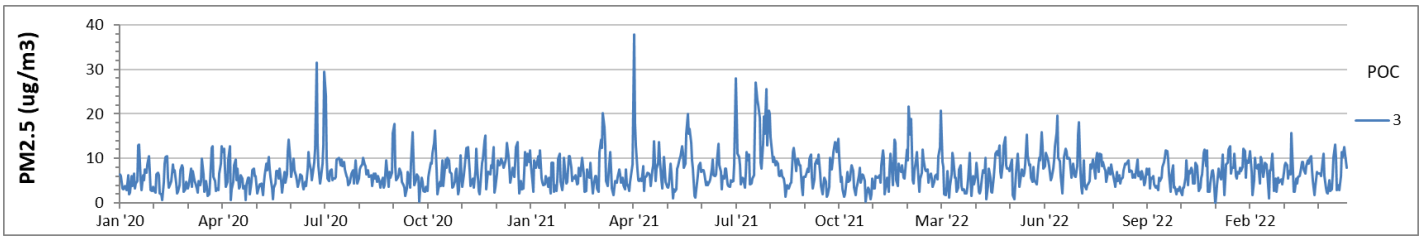


Maryville – Blount County

Address	2007 Sequoyah Avenue Maryville TN 37803
AQSID	47-009-0011
CBSA	28940
Lat, Lon	35.768847, -83.942152
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022 FEM
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Maryville site is in Blount County, Tennessee and currently supports ambient air monitoring for fine particulate matter. This site is located south of Knoxville and northwest of the GSMNP. This site is an upwind site from the core Knoxville MSA. The Maryville $PM_{2.5}$ monitoring site began on May 1, 2000 as a part of the original $PM_{2.5}$ state network. Because of the importance this site serves in assessing the upwind $PM_{2.5}$ levels entering the Knoxville area, this site was determined to remain in operation over five years (2023 through 2027). The Knoxville MSA has four $PM_{2.5}$ SLAMS sites and is only required to have one to meet the minimum requirements. This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from Georgia and North Carolina.

Maryville Daily Air Quality

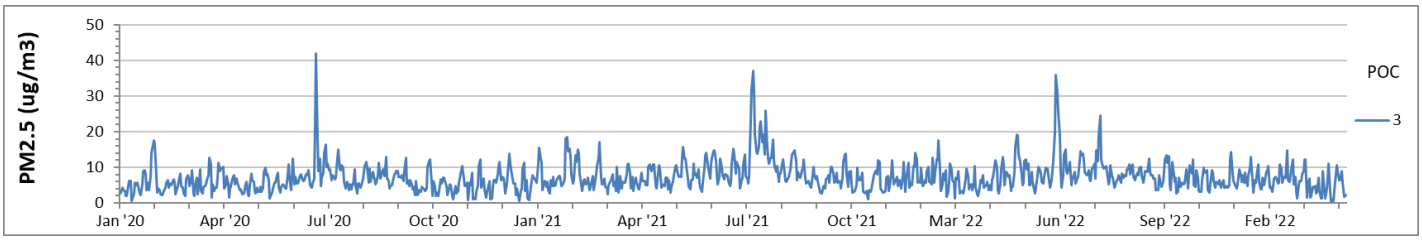


Dyersburg – Dyer County

Address	175-B Greenwood Street, Dyersburg TN 38024
AQSID	47-045-0004
CBSA	20540
Lat, Lon	36.05266, -89.382157
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Dyersburg site is in Dyer County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located northwest of Jackson and north-northeast of Memphis, Tennessee. This site is downwind from the core Memphis MSA. Monitoring for $PM_{2.5}$ began at the Dyersburg site on August 22, 1998 as a part of the original $PM_{2.5}$ state network. Because of the importance this site serves in assessing the $PM_{2.5}$ levels outside of the Memphis area, this site was determined to remain in operation over five years (2023 through 2027). This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from adjacent states.

Dyersburg Daily Air Quality

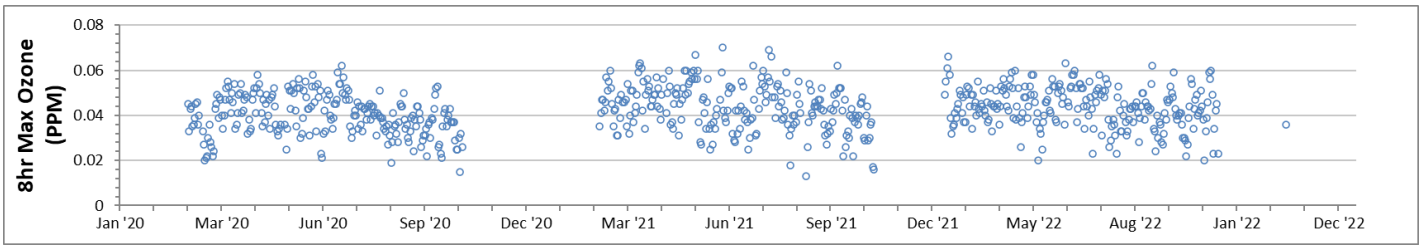


New Market – Jefferson County

Address	Forester Rd, New Market, TN 37820
AQSID	47-089-0002
CBSA	34100
Lat, Lon	36.105629, -83.602077
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Max Ozone Concentration
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Agricultural
Location Setting	Rural

The New Market site is in Jefferson County, Tennessee and currently supports ambient air monitoring for ozone. The site is located east-northeast of Knoxville and west-southwest of Morristown, Tennessee, downwind from the core Knoxville MSA and within the Morristown MSA. Ozone monitoring began at the New Market site on March 1, 1999 and meets the requirement for having one ozone site in the Morristown MSA. This site is used with the ozone AQI forecasting program for verification and to help address transport downwind of the Knoxville area, this site was determined to remain in operation over five years (2023 through 2027).

New Market Daily Air Quality

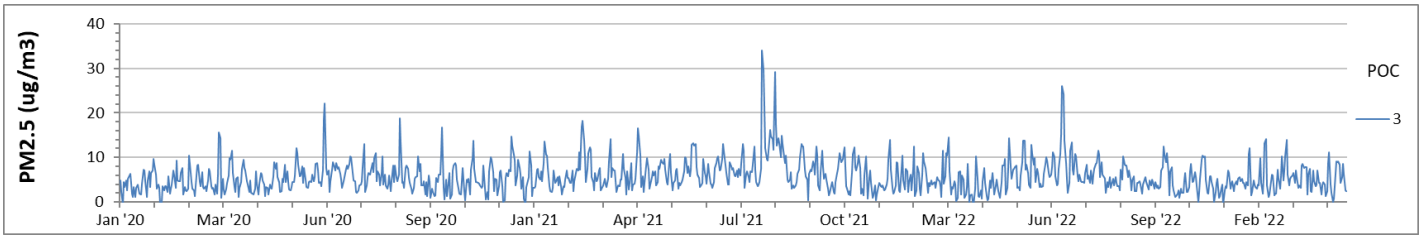


Loretto – Lawrence County

Address	60 Busby Rd, Loretto, TN 38469
AQSID	47-099-0003
CBSA	29980
Lat, Lon	35.116878, -87.419725
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Upwind background, population exposure
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Agricultural
Location Setting	Rural

The Loretto ambient air monitoring site is in Lawrence County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located on the southern border of Tennessee, north of Alabama. The site is southwest of Nashville and southeast of Jackson, Tennessee. This site is part of the Nashville combined statistical area (CSA) and is in the Lawrenceburg micropolitan area (CBSA) in Tennessee. Loretto $PM_{2.5}$ ambient air monitoring began on January 14, 2019 and replaced the original ambient air $PM_{2.5}$ monitoring state site location at 355 Busby Rd, Loretto, TN 38469. The Loretto ambient air monitoring site is part of the $PM_{2.5}$ AQI forecasting program and serves as a background ambient air $PM_{2.5}$ monitoring site. It was determined to remain in operation over five years (2023 through 2027).

Loretto Daily Air Quality

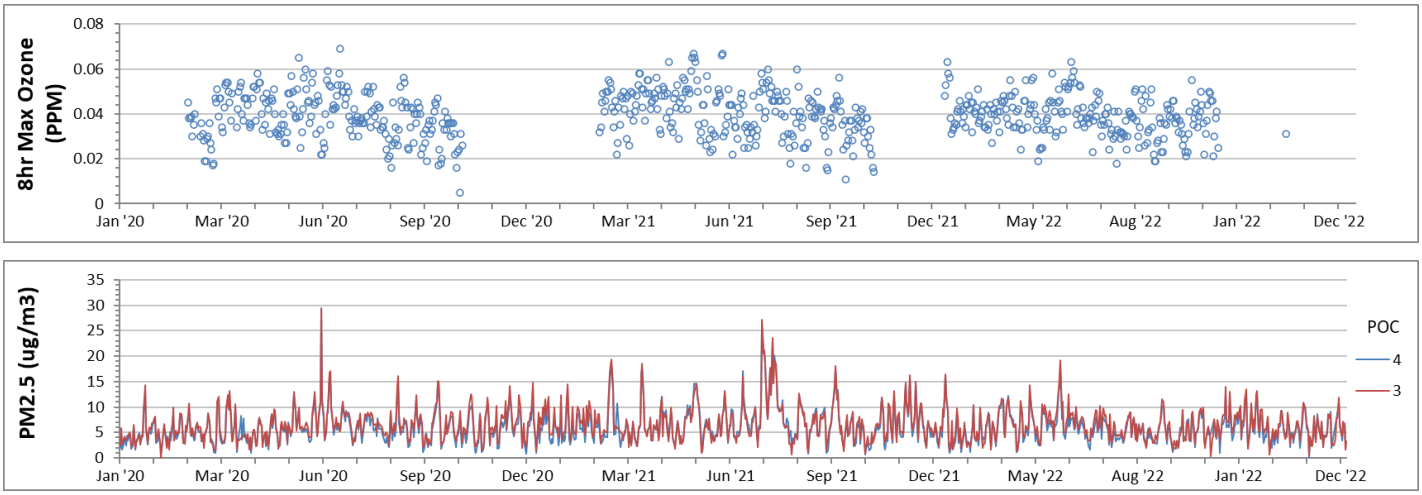


Loudon – Loudon County

Address	2175 Roberts Road, Loudon, TN 37774		
AQSID	47-105-0109		
CBSA	28940		
Lat, Lon	35.721095, -84.343035		
Parameter Code	44201	88101	88101
Parameter Name	O_3	$PM_{2.5}$ Continuous	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	3 (Primary)	4 (Collocated)
Int	W	1	1
Year	2014	2017	2018
Collection Frequency	Hourly	Hourly	Hourly
Method	087	209	209
FRM/FEM Instrument	Model T400 Ozone Analyzer	Met One BAM 1022	Met One BAM 1022
Analysis	Ultraviolet Absorption	Real Time Beta Attenuation Mass Monitor	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	EQPM-1013-209	EQPM-1013-209
Monitor Objective	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area		
Measurement Scale	Neighborhood		
Land Use Type	Residential		
Location Setting	Suburban		

The Loudon site is located at 2175 Roberts Road, in Loudon County, TN 37774. The Loudon site supports ambient air monitoring for $PM_{2.5}$ and O_3. It is located southwest of Knoxville and northeast of Chattanooga. This site is upwind of the Knoxville MSA and downwind from the Chattanooga MSA. Monitoring for $PM_{2.5}$ began at the Loudon site on August 1, 2003, as a part of a Loudon air quality study and complaint investigation. Ozone monitoring began at the Loudon site in March of 2004. The Loudon site is serving as one of two collocated $PM_{2.5}$ ambient air monitoring sites. Monitoring at this site is used by the AQI forecasting program for verification for the Knoxville MSA and was determined to remain in operation over five years (2023 through 2027).

Loudon Daily Air Quality

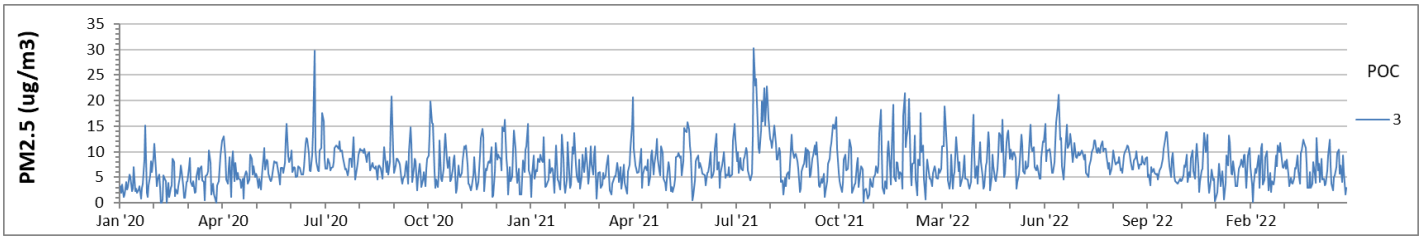


Athens – McMinn County

Address	Saint Mark AME Zion Church: 707 North Jackson St, Athens, TN 37303
AQSID	47-107-1002
CBSA	11940
Lat, Lon	35.450115, -84.596195
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban and Center City

The Athens site is in McMinn County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located northeast of Chattanooga and southwest of Knoxville, Tennessee downwind from the Chattanooga MSA, located in the Athens micropolitan area. $PM_{2.5}$ monitoring began at the Athens site on February 3, 2000 as a part of the original $PM_{2.5}$ state network. The FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on July 1, 2017 and is part of the $PM_{2.5}$ AQI forecasting program. This site serves to quantify air quality in this developing area of the state and was determined to remain in operation for five years (2023 through 2027).

Athens Daily Air Quality

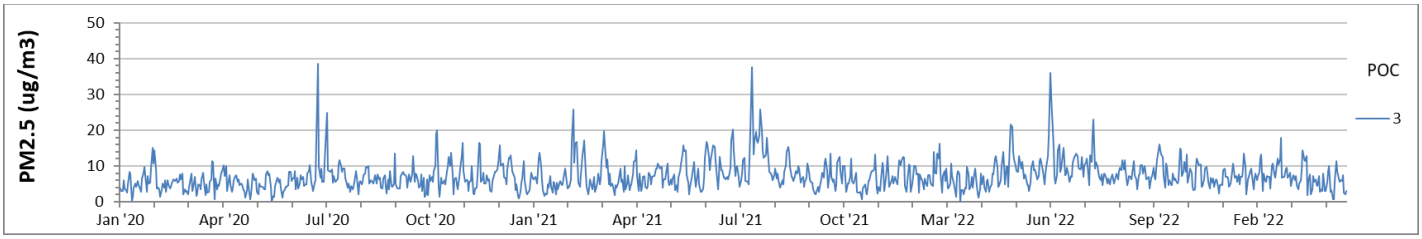


Jackson – Madison County

Address	North Park Soccer Complex, 210 Demonbreun Drive, Jackson, TN 38305
AQSID	47-113-0010
CBSA	27180
Lat, Lon	35.705319, -88.81964
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Jackson site is in Madison County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located northeast of Memphis, southeast of Dyersburg and is part of the Jackson MSA in Tennessee. Monitoring for $PM_{2.5}$ began at the new Jackson site on March 26, 2019 and replaces the original Jackson ambient air $PM_{2.5}$ monitoring state site location at 1371-A North Parkway, Jackson, TN 38301. The Jackson MSA has a single FEM continuous $PM_{2.5}$ sampler and is a supplemental SLAMS $PM_{2.5}$ site. This site was determined to remain in operation over five years (2023 through 2027) primarily because it provides valuable upwind $PM_{2.5}$ data for the Nashville AQI forecast.

Jackson Daily Air Quality

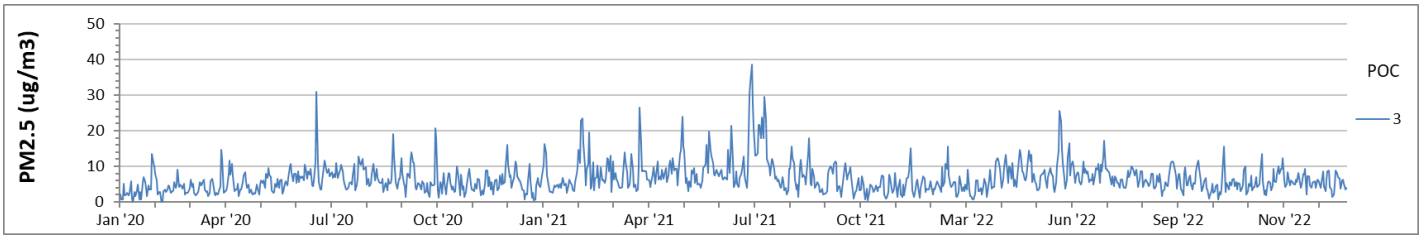


Columbia – Maury County

Address	1600 Nashville Hwy, Columbia, TN
AQSID	47-119-2007
CBSA	34980
Lat, Lon	35.65188, -87.0096
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban and Center City

The Columbia site is in Maury County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located south-southwest of Nashville and northwest of Lewisburg, Tennessee. This site is located upwind, within the Nashville MSA. $PM_{2.5}$ monitoring began at the Columbia site on December 25, 1998 as a part of the original $PM_{2.5}$ state network. This site assists with the $PM_{2.5}$ AQI forecasting program. The FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on July 1, 2017. This site was determined to remain in operation over five years (2023 through 2027) primarily because it is the only $PM_{2.5}$ site in this region.

Columbia Daily Air Quality

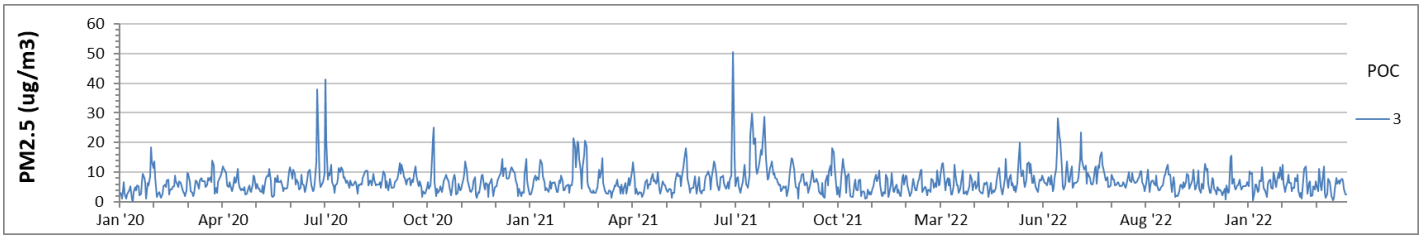


Clarksville – Montgomery County

Address	1200 West Creek Coyote Trail, Clarksville, TN
AQSID	47-125-2001
CBSA	17300
Lat, Lon	36.611411, -87.384666
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Clarksville site is in Montgomery County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located within the Clarksville city limits northwest of Nashville, Tennessee, and is located within the Clarksville, TN-KY MSA. Monitoring for $PM_{2.5}$ at 1200 West Creek Coyote Trail, Clarksville, TN began on April 3, 2019. It replaces the original Clarksville ambient air $PM_{2.5}$ monitoring site location at 1514 Golf Club Ln, Clarksville, TN 37043. This site assists with the $PM_{2.5}$ AQI forecasting program. The Clarksville MSA has a single FEM continuous $PM_{2.5}$ sampler that is a supplemental SLAMS $PM_{2.5}$ site for the MSA. The new site will remain in operation over five years (2023 through 2027) primarily because it is the only continuous $PM_{2.5}$ site in the MSA.

Clarksville Daily Air Quality

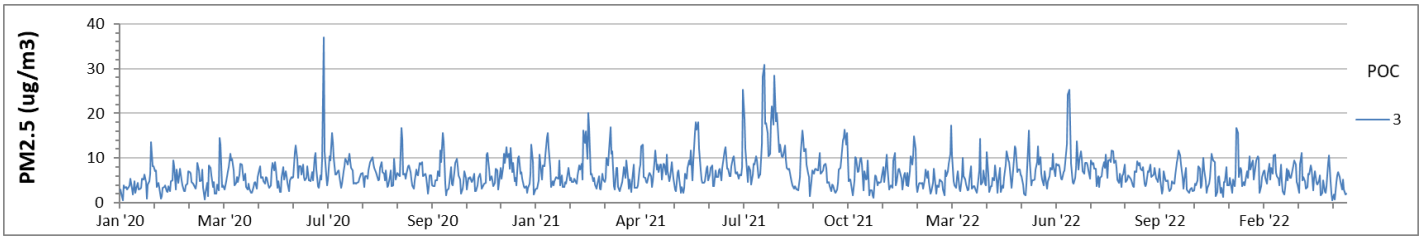


Cookeville – Putnam County

Address	630 East 20th Street, Cookeville TN 38501
AQSID	47-141-0005
CBSA	18260
Lat, Lon	36.185702, -85.492107
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Cookeville site is in Putnam County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is located east of Nashville, on the Highland Rim, just west of the Cumberland Plateau. It is not located in or near an MSA but is within the largest micropolitan statistical area in the state. $PM_{2.5}$ monitoring began at the Cookeville site on August 15, 2006 after the site was relocated. This site was determined to remain in operation over five years (2023 through 2027) primarily because it is the only $PM_{2.5}$ site in this region.

Cookeville Daily Air Quality

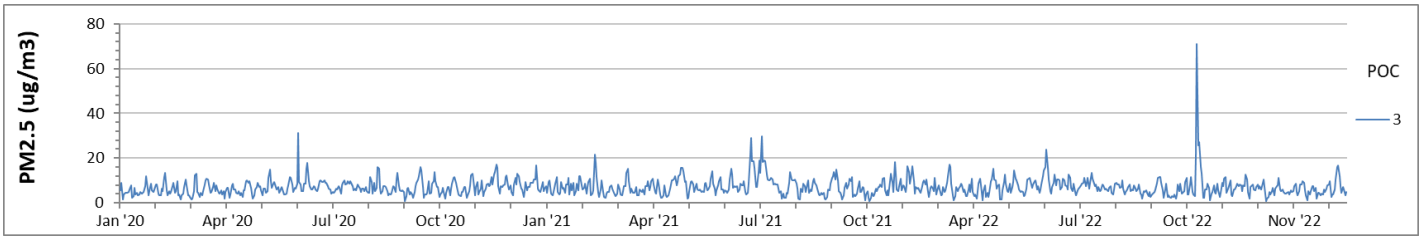


Harriman – Roane County

Address	Harriman High: 1002 N. Roane St., Harriman, TN 37748
AQSID	47-145-0004
CBSA	28940
Lat, Lon	35.939078, -84.542802
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Industrial
Location Setting	Suburban

The Harriman site is in Roane County, Tennessee and currently supports air monitoring for $PM_{2.5}$. This site is located west of Knoxville and west-southwest of Oak Ridge, Tennessee. It is upwind from the Knoxville MSA. $PM_{2.5}$ monitoring began at the Harriman site on January 1, 1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the $PM_{2.5}$ AQI forecasting program. This site was determined to remain in operation over five years (2023 through 2027). The Knoxville MSA has four operating $PM_{2.5}$ SLAMS sites and is required to have one $PM_{2.5}$ monitoring site.

Harriman Daily Air Quality

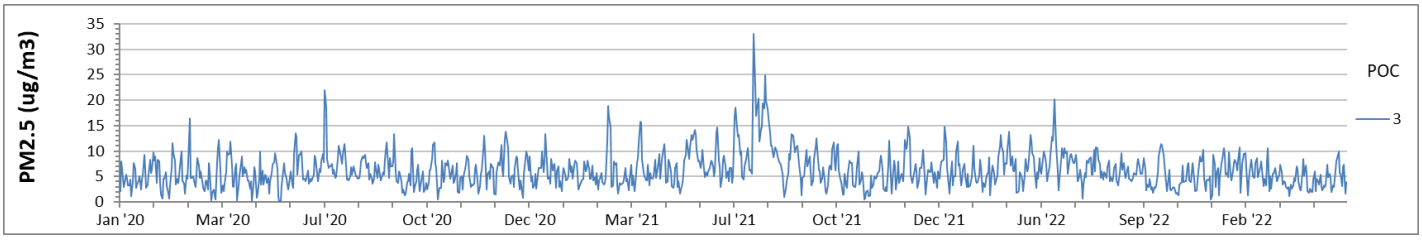


Kingsport ($PM_{2.5}$) – Sullivan County

Address	1649 D Street Kingsport TN 37664
AQSID	47-163-1007
CBSA	28700
Lat, Lon	36.538761, -82.521599
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is in Sullivan County, Tennessee and currently supports ambient air monitoring for $PM_{2.5}$. This site is in the far northeast corner of the state and is south of the state of Virginia. This site is upwind of Bristol, TN-VA and located within the Kingsport-Bristol-Bristol, Tennessee-Virginia MSA, in the Kingsport city limits. $PM_{2.5}$ monitoring began at the Kingsport site on October 1, 1998 as a part of the original $PM_{2.5}$ state network. It is also part of the $PM_{2.5}$ AQI forecasting program. The Kingsport MSA has a single FEM continuous $PM_{2.5}$ sampler and is a supplemental SLAMS $PM_{2.5}$ site for the MSA. This site was determined to remain in operation over five years (2023 through 2027) primarily because it is the only $PM_{2.5}$ site in this region.

Kingsport ($PM_{2.5}$) Daily Air Quality

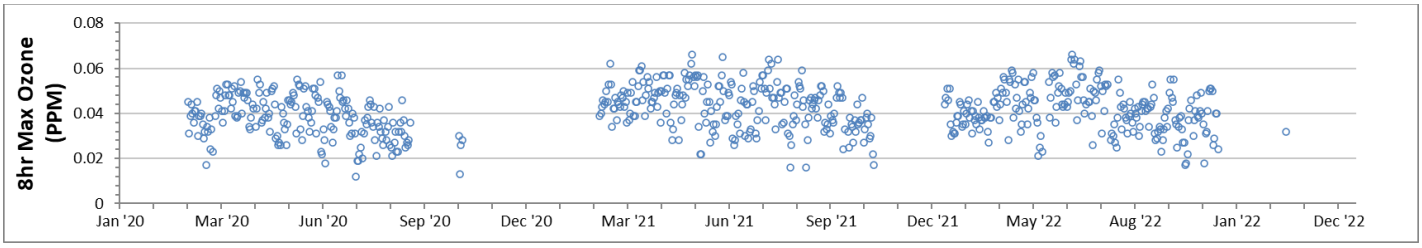


Blountville – Sullivan County

Address	Indian Springs School Shawnee Drive Blountville, TN 37664
AQSID	47-163-2002
CBSA	28700
Lat, Lon	36.541365, -82.424555
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Rural

The Blountville site is in Sullivan County, Tennessee and currently supports ambient air monitoring for ozone. It is located east of Kingsport, near Blountville, TN. This site is downwind from the city of Kingsport. Monitoring for ozone at the Blountville site began January 1, 1980 and is used with the ozone AQI forecasting program for verification and to help address the ozone impacts in the Kingsport-Bristol-Bristol Tennessee-Virginia and Johnson City MSAs. The Kingsport MSA has two ambient air ozone sites operating and is required to have only one ambient air ozone site. This site was determined to remain in operation over five years (2023 through 2027) primarily because of its location within the Kingsport-Bristol-Bristol MSA.

Blountville Daily Air Quality

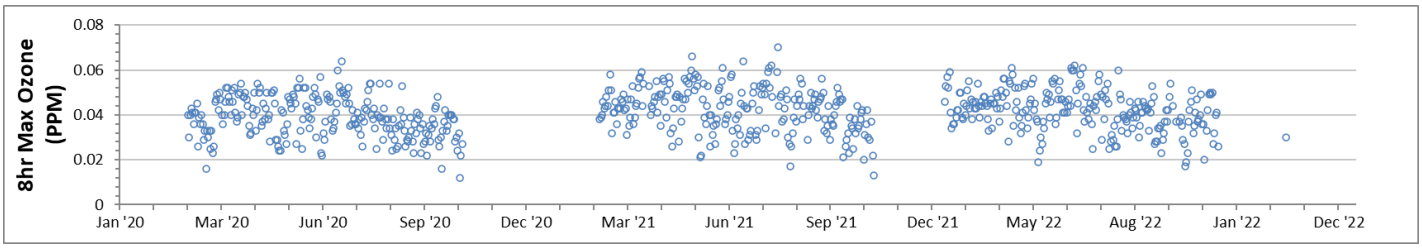


Kingsport O_3 – Sullivan County

Address	3301 Bloomingdale Rd. Kingsport TN 37660
AQSID	47-163-2003
County Name	Sullivan
CBSA	28700
Lat, Lon	36.58211, -82.485742
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is in Sullivan County, Tennessee and currently supports ambient air monitoring for ozone. It is in the far northeast corner of the state and is south of the State of Virginia near the Tennessee-Virginia line. This site is upwind of Gate City, VA and downwind of the Kingsport city limits. Kingsport is also a part of the Kingsport-Bristol-Bristol Tennessee-Virginia MSA and also provides data for the AQI forecasting program. Ozone monitoring began at the Kingsport site on April 1, 1995. The Kingsport MSA has two ambient air ozone sites operating and is required to have only one ambient air ozone site. This site was determined to remain in operation over five years (2023 through 2027) primarily because of its location within the Kingsport-Bristol-Bristol MSA.

Kingsport Daily Air Quality

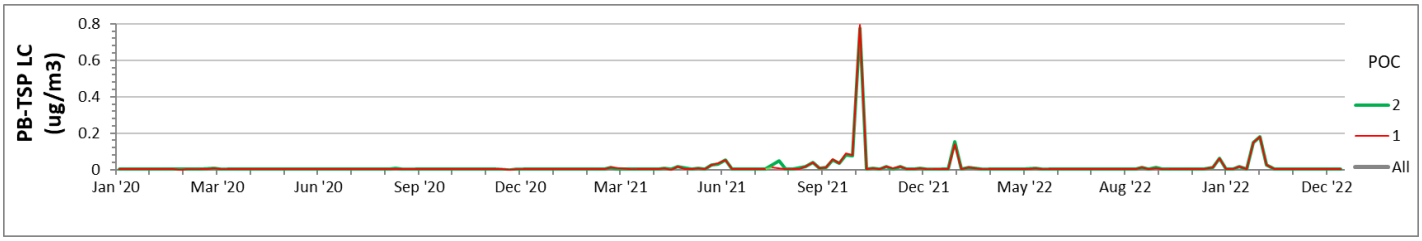


Exide – Sullivan County

Address	364 Exide Drive, Bristol TN 37620	
AQSID	47-163-3004	
County Name	Sullivan	
CBSA	28700	
Lat, Lon	36.52443, -82.273296	
Parameter Code	14129	14129
Parameter Name	Pb	Pb
Monitor Type	SLAMS	SLAMS
POC	1 (Primary)	2 (Collocated)
Int	7	7
Collection Frequency	1 In 6	1 In 6
Method	193	193
FRM/FEM Instrument	Pb-TSP/ICP Spectra (ICP-MS)	Pb-TSP/ICP Spectra (ICP-MS)
Analysis	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract with Hot Nitric Acid	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract with Hot Nitric Acid
Ref Mtd ID	EQL-0512-201	EQL-0512-201
Monitor Objective	Source Oriented	
Dominant Source	Point	
Measurement Scale	Urban Scale	
Land Use Type	Industrial	
Location Setting	Urban and Center City	

The Exide site is in Sullivan County, Tennessee and currently supports ambient air monitoring for lead. It is located east of Kingsport and northeast of Blountville on the Tennessee-Virginia state line. This site is downwind from Johnson City and Blountville and is in the Kingsport Bristol MSA. Lead monitoring began at the Exide site on January 1, 2010 to verify lead NAAQS compliance at a lead battery plant. This area is now classified as attainment for the 2008 lead NAAQS. The former lead source shut down in 2013, surrendered its air permits on November 3, 2014, and has removed all lead processing emission sources. Following a bankruptcy filing in May 2020, the Bristol Exide property was transferred to an Environmental Response Trust (ERT) in October 2020. The ERT then transferred the title to Phoenix Investments, LLC in March 2021 following a Limited Site Investigation. The Limited Site Investigation conducted by Key Engineering Group and Strata Group, of Lexington, Kentucky included soil sampling conducted outside the former lead battery plant by taking a total 18 soil samples from depths between 0 to 15.5 feet below ground. The soil analysis concluded that the historical Exide operations did not result in a release to the soils outside the building. In April 2021, a cleanup of the interior was initiated and is ongoing. No other existing lead emitting sources are in the area around the monitor. The site is expected to remain in operation in 2023.

Exide Daily Air Quality

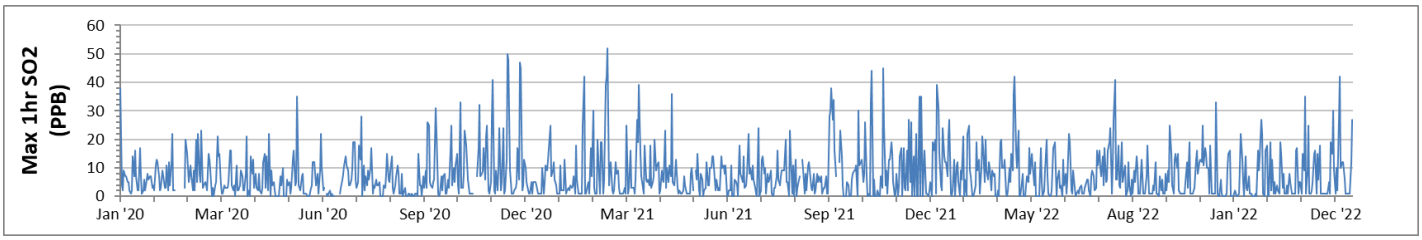


Ross N Robinson – Sullivan County

Address	Wilburn Drive, Kingsport, TN 37664
AQSID	47-163-6001
County Name	Sullivan
CBSA	28700
Lat, Lon	36.532616, -82.516306
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Ross N Robinson site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The Ross N Robinson monitor is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational on July 21, 2016. This monitoring site is operated to satisfy the PWEI requirements for the Kingsport, TN CBSA and secondly, as a part of a network of four SO_2 monitoring sites designed to characterize the maximum expected concentrations in the nonattainment area.

Ross N Robinson Daily Air Quality

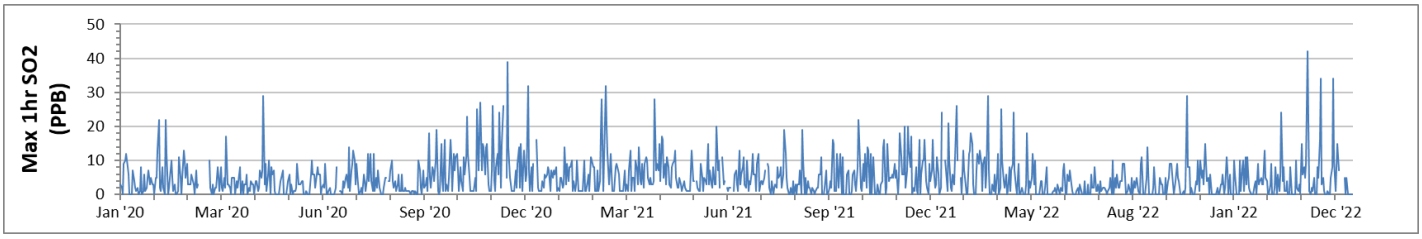


Skyland Dr. – Sullivan County

Address	Skyland Drive at Bagwell St., Kingsport, TN
AQSID	47-163-6002
County Name	Sullivan
CBSA	28700
Lat, Lon	36.521066, -82.502454
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Skyland Drive ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational on September 1, 2016. The site was established to characterize the maximum expected concentrations in the nonattainment area. This site is one of 4 sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area.

Skyland Dr. Daily Air Quality

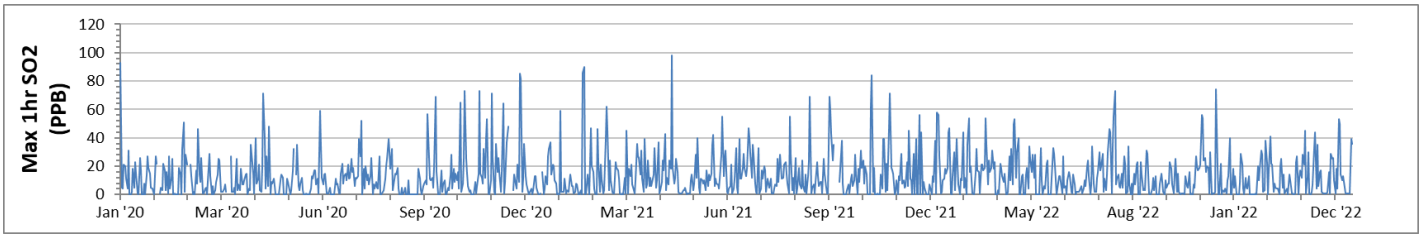


Andrew Johnson Elementary School – Sullivan County

Address	1001 Ormond Drive, Kingsport, TN
AQSID	47-163-6003
County Name	Sullivan
CBSA	28700
Lat, Lon	Lat: 36.526359; Long: -82.528677
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Andrew Johnson Elementary School ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant. This site began monitoring for SO_2 on January 1, 2019. This site is one of four sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area.

Andrew Johnson Elementary School Daily Air Quality

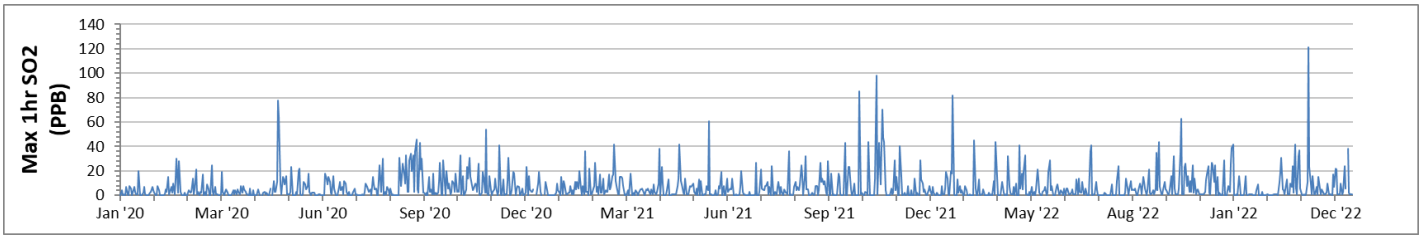


Happy Hill – Sullivan County

Address	2105 Happy Hill Road, Kingsport, TN
AQSID	47-163-6004
County Name	Sullivan
CBSA	28700
Lat, Lon	Lat: 36.513026; Long: -82.550498
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	API Model 100 E SO_2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Happy Hill Road ambient air monitoring site is in Sullivan County, Tennessee and currently supports ambient air monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant. The Happy Hill Road site was established and operational on October 10, 2018 but officially began collecting data for NAAQS comparison on January 1, 2019. This site is one of four sites in the Kingsport, TN CBSA designed to characterize the maximum expected concentrations in the nonattainment area.

Happy Hill Daily Air Quality

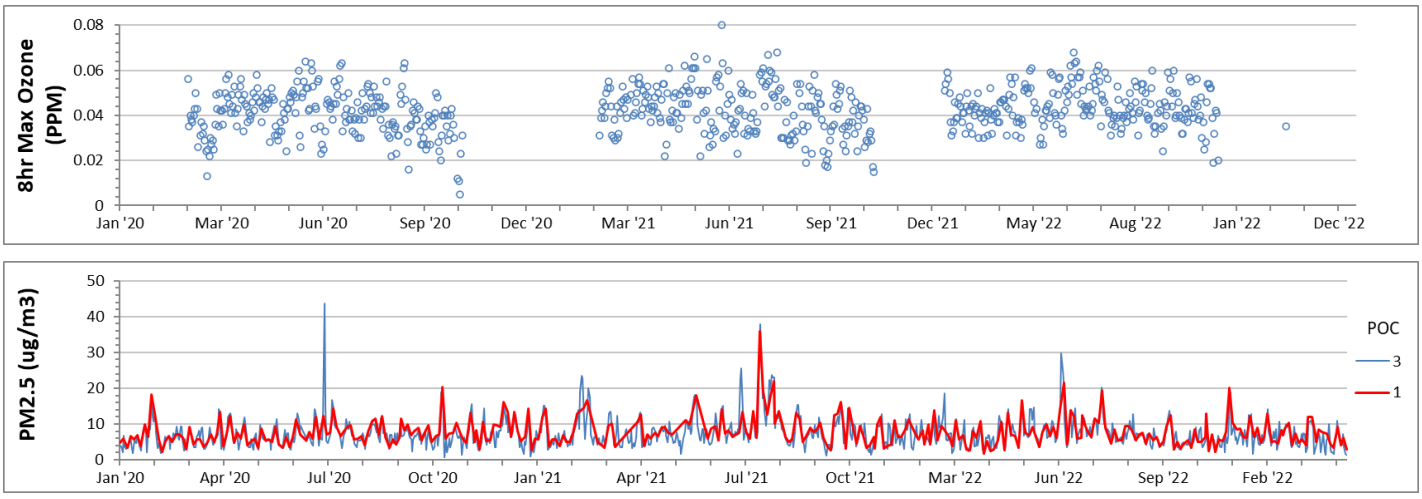


Hendersonville - Sumner County

Address	Rockland Recreational Area, Old Hickory Dam, Hendersonville, TN		
AQSID	47-165-0007		
CBSA	34980		
Lat	36.29756, -86.653137		
Parameter Code	44201	88101	88101
Parameter Name	O_3	$PM_{2.5}$	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	1 (Collocated)	3 (Primary)
Int	W	7	1
Collection Frequency	Hourly	1 in 3	Hourly
Method	087	118	209
FRM/FEM Instrument	Model T400 Ozone Analyzer	R&P Model 2025/Thermo Scientific 2025i	Met One BAM 1022
Analysis	Ultraviolet Absorption	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	RFPS-1006-145	EQPM-1013-209
Monitor Objective	Highest Conc	Population Exposure	
Dominant Source	Area	Area	
Measurement Scale	Urban	Urban	
Land Use Type	Industrial	Industrial	
Location Setting	Rural	Rural	

The Hendersonville site is in Sumner County, Tennessee and currently supports ambient air monitoring for ozone and $PM_{2.5}$. This site is located northeast of Nashville and west-southwest of Gallatin, Tennessee. This site is downwind from Nashville and is considered part of the Nashville MSA. Ozone monitoring began on January 1, 1973 and is conducted for the ozone AQI forecasting program for verification and to help address NAAQS compliance in the Nashville MSA. Monitoring for $PM_{2.5}$ at the Hendersonville site began on October 1, 1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the PM fine AQI forecasting program. An FEM continuous $PM_{2.5}$ sampler replaced the collocated FRM sampler on January 1, 2018. This site was determined to remain in operation over five years (2023 through 2027) primarily because it is the ozone DV site for the Nashville MSA and is downwind from the Nashville fine particulate precursor sources. The Nashville MSA has five ozone monitors operating and is only required to have two.

Hendersonville Daily Air Quality

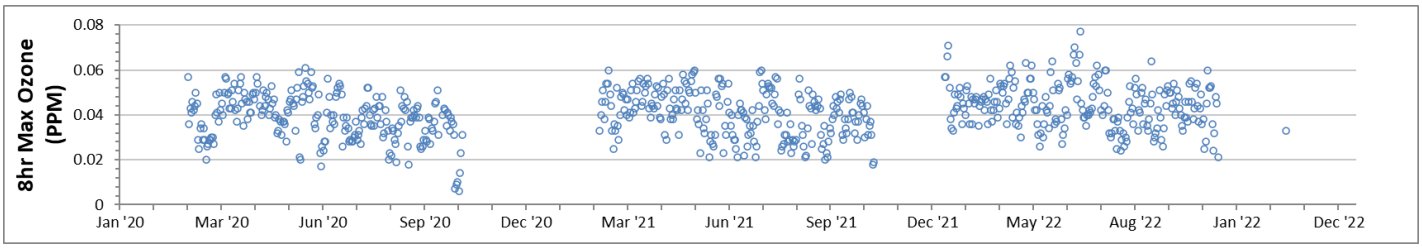


Fairview –Williamson County

Address	Fairview Middle School: 7200 Cumberland Dr, Fairview, TN
AQSID	47-187-0106
CBSA	34980
Lat, Lon	35.949765, -87.138246
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Agricultural
Location Setting	Rural

The Fairview site is in Williamson County, Tennessee and currently supports ambient air monitoring for ozone. It is located southwest of Nashville and northwest of Franklin, Tennessee. This site is upwind from the core Nashville MSA. Ozone monitoring at the Fairview site began on October 30, 2001 is conducted for the ozone AQI forecasting program and to help address upwind ozone concentrations entering the Nashville MSA. The Nashville MSA has five ozone sites operating and is only required to have two ozone sites. Due to this site's importance in assessing the area ozone levels outside and upwind of the Nashville area, it was determined to remain in operation over five years (2023 through 2027).

Fairview Daily Air Quality

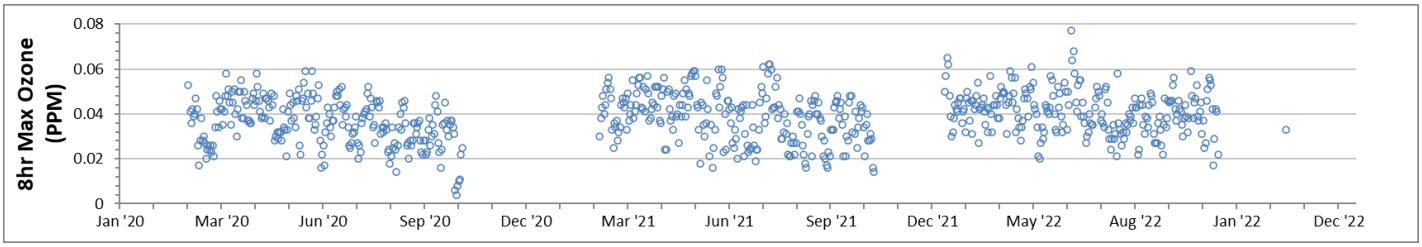


Cedars of Lebanon – Wilson County

Address	Cedar Forest Rd., Lebanon, TN
AQSID	47-189-0103
CBSA	34980
Lat, Lon	36.060895, -86.286291
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	087
FRM/FEM Instrument	Model T400 Ozone Analyzer
Analysis	Ultraviolet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Cedars site is in Wilson County, Tennessee and currently supports ambient air monitoring for ozone. This site is located east of Nashville and north of Murfreesboro, Tennessee. This site is downwind from Murfreesboro, Tennessee and is located within the Nashville MSA. The Cedars site began monitoring for ozone on May 1, 1998 and supports the ozone AQI forecasting program for verification and to help address downwind ozone levels in the Nashville MSA. The Nashville MSA has five ozone sites operating and is only required to have two ozone sites. Because of the importance that this site serves in assessing the area ozone levels outside and downwind of the Nashville area, this site was determined to remain in operation over five years (2023 through 2027).

Cedars Daily Air Quality



National Park Service Monitors

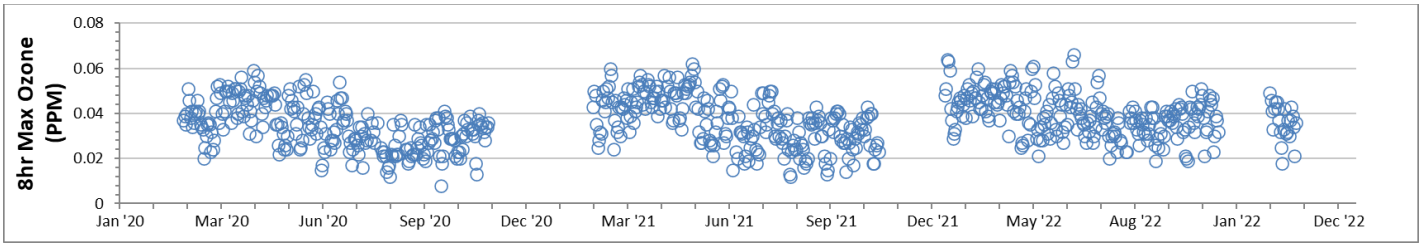
The NPS air monitoring sites are included as a courtesy to the readers of the TDEC DAPC 2021 AMNP. These sites are included because they are collecting, and reporting data previously used for attainment decisions in Tennessee and that can be used for future determinations. The NPS sites are not a part of the TDEC DAPC air monitoring networks and TDEC DAPC does not report their data to the EPA AQS data systems; however, these data may continue to be used to support air quality forecasting by TDEC in the area.

Cades Cove – Blount County (GSM NP)

Address	Great Smoky Mountains NP - Cades Cove
AQSID	47-009-0102
CBSA	28940
Lat, Lon	35.603056, -83.783611
Parameter Code	44201
Parameter Name	O_3
Monitor Type	Non-EPA Federal
POC	1
Int	W
Collection Frequency	Hourly
Method	53
FRM/FEM Instrument	Monitor Labs 8810
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0881-053
Monitor Objective	Highest Concentration
Dominant Source	0
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Cades Cove site is in Blount County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. The Cades Cove site was initially established on May 1, 1994 and is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. It is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP. It is the responsibility of the NPS to operate, maintain, and conduct all QA/QC activities at this site in accordance with 40 CFR Part 58. The National Park Service is responsible for verifying, validating, and certifying the ozone data collected.

Cades Cove Daily Air Quality

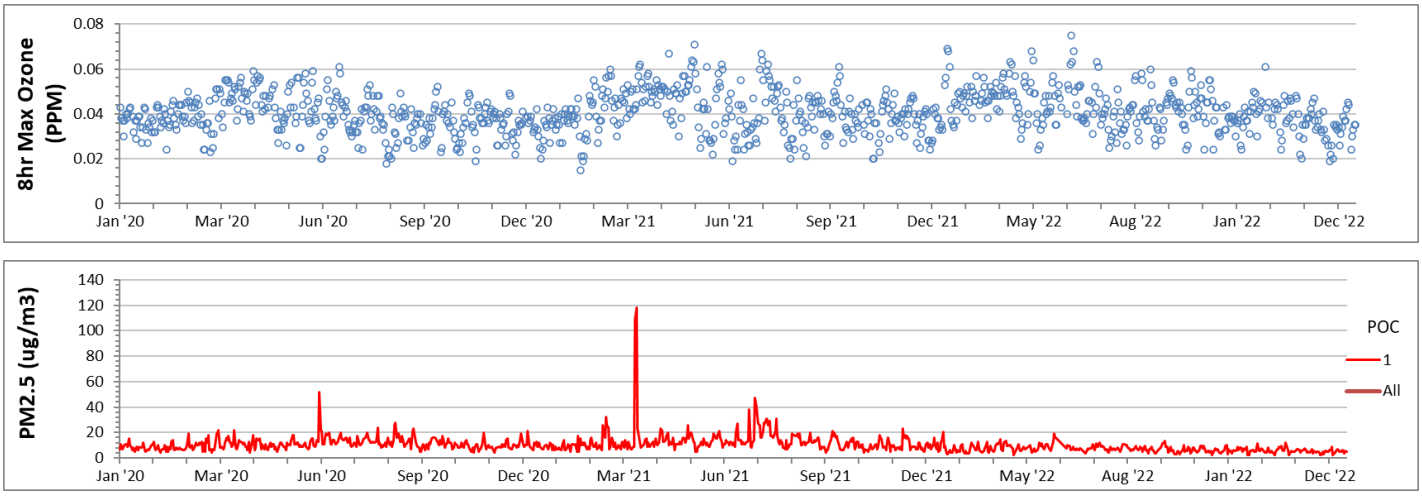


Look Rock – Blount County (GSM NP)

Address	Great Smoky Mountains NP Look Rock	
AQSID	47-009-0101	
CBSA	28940	
Lat, Lon	35.6334799, -83.941605999999993	
Parameter Code	44201	88502
Parameter Name	O_3	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SPM
POC	1	1
Int	W	1
Collection Frequency	Hourly	Hourly
Method	053	716
FRM/FEM Instrument	Monitor Labs 8810	None
Analysis	Ultraviolet	TEOM Gravimetric 50 deg C
Ref Mtd ID	EQOA-0881-053	None
Monitor Objective	General Background	
Dominant Source	0	
Measurement Scale	0	
Land Use Type	Forest	
Location Setting	Rural	

The Look Rock site is in Blount County, Tennessee and currently supports ambient air monitoring for ozone and other pollutants. The Look Rock site was initially established in 1980 and is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. Ozone monitoring began on July 23, 1998 and $PM_{2.5}$ monitoring began on May 1, 2002. This site is one of two NCore sites in the state and serves as the park's Interagency Monitoring of Protected Visual Environments (IMPROVE). The Look Rock site is used with the PM Fine AQI forecasting program for verification and to help address fine particulate levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

Look Rock Daily Air Quality

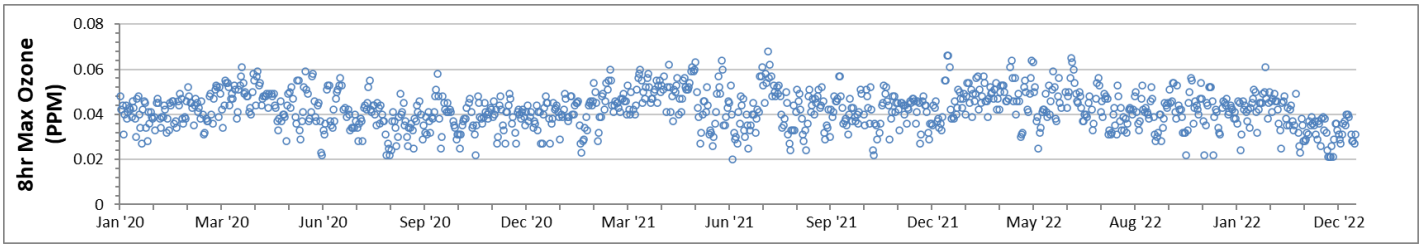


Cove Mountain – Sevier Country (GSM NP)

Address	Great Smoky Mountain NP- Cove Mountain
AQSID	47-155-0101
CBSA	42940
Lat, Lon	35.6966669999999, -83.609722
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	General/Background
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Forest
Location Setting	Rural

The Cove Mt. site is in Sevier County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. It is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. Ozone monitoring began at Cove Mountain site on July 1, 1988. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

Cove Mountain Daily Air Quality

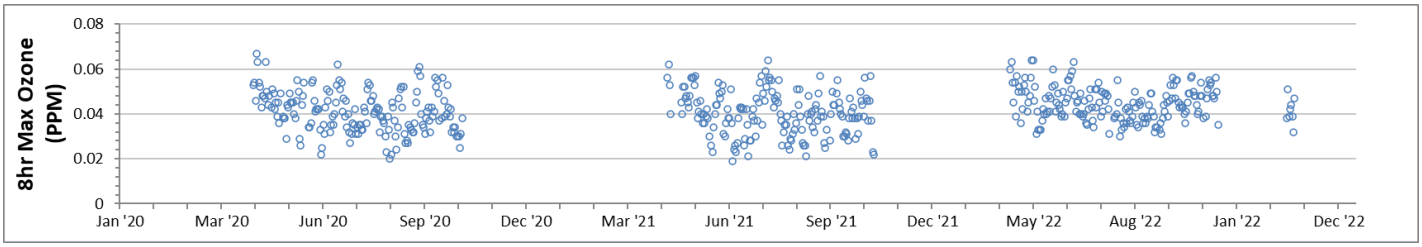


Clingman's Dome – Sevier County (GSM NP)

Address	Great Smoky Mountain Np Clingman's Dome
AQSID	47-155-0102
CBSA	42940
Lat, Lon	35.562778, -83.4981
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Year	2014
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultraviolet
Ref Mtd ID	EQOA-0880-47
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Clingman's Dome site is in Sevier County, Tennessee and currently supports ambient air monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. The Clingman's Dome site began ozone monitoring on April 1, 1993. This site is used with the ozone AQI forecasting program and to help address ozone levels found in the GSMNP area. This site is located at the highest point inside of Tennessee and is on the border of Tennessee and North Carolina. The elevation of the site poses challenges in maintenance and access as the site is often impacted in the late fall and through-out the winter and spring by excessive snow fall and icing events that prevent access to the site. The ozone data collection season at this site is truncated due to the site access issues in March and April and in some years in October due to early snowfall events. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating, and certifying the ozone data collected.

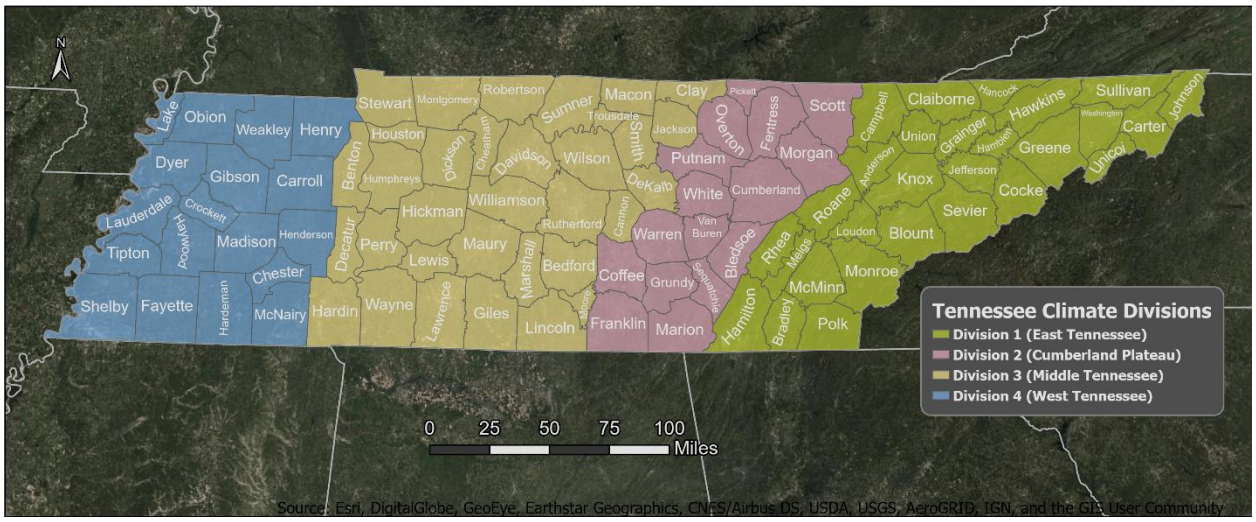
Clingman's Dome Daily Air Quality



Tennessee Geographic Regions, Descriptions and Climate

Tennessee Climate

The following discussion of Tennessee's climate is provided by the Tennessee Climate Office at East Tennessee State University.



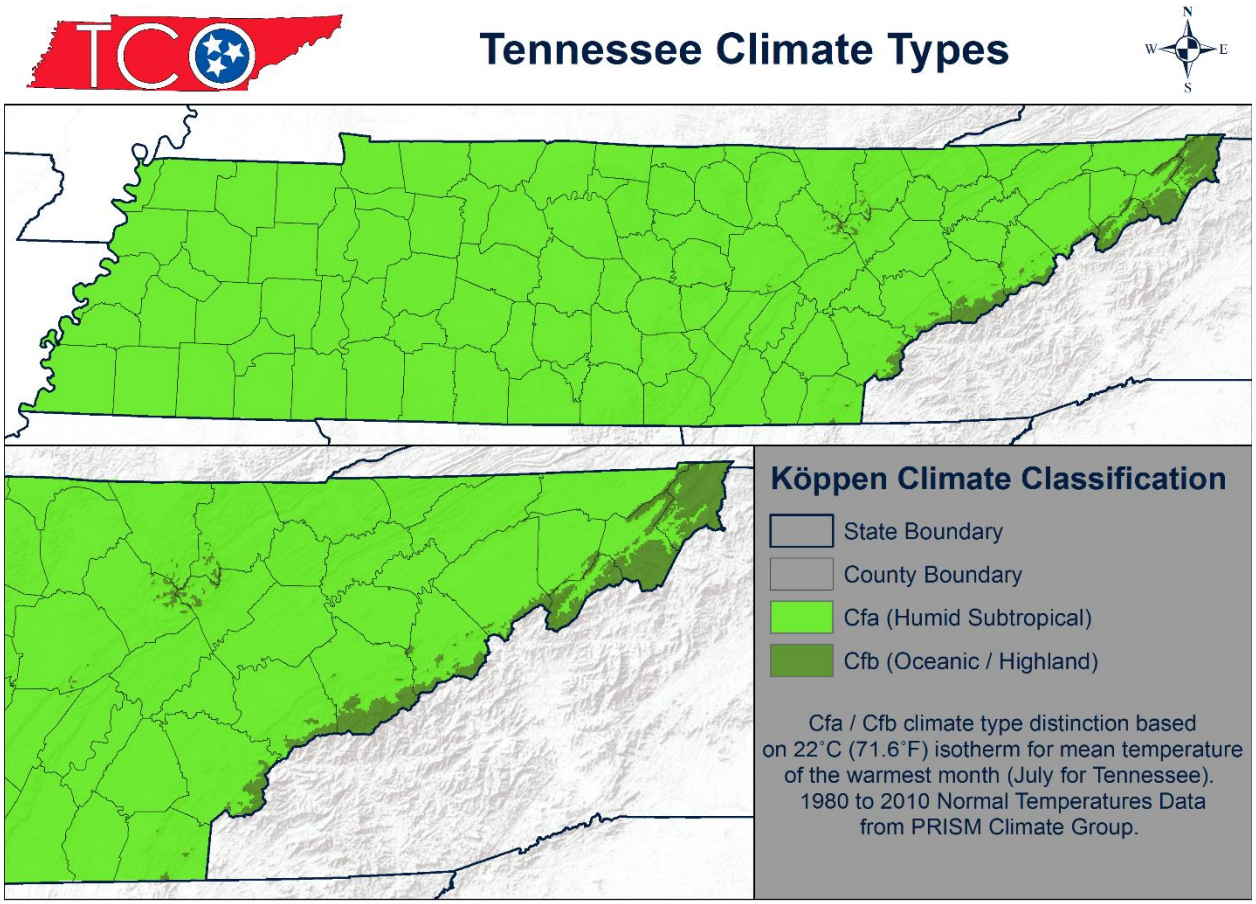
There are 344 climate divisions in the continental United States. Tennessee is divided into four unique climate divisions. Click Here for more information.

Topographic Features - The topography of Tennessee is quite varied, stretching from the lowlands of the Mississippi Valley to the mountain peaks in the east. The westernmost part of the state, between the bluffs overlooking the Mississippi River and western valley of the Tennessee River, is a region of gently rolling plains sloping gradually from 200 to 250 feet in the west to about 600 feet above sea level in the hills overlooking the Tennessee River. This region is defined as Division 4 (West Tennessee). The hilly Highland Rim, in a wide circle touching the Tennessee River Valley in the west and the Cumberland Plateau in the east, together with the enclosed Central Basin make up the whole of Middle Tennessee. The Highland Rim ranges from about 600 feet in elevation along the Tennessee River to 1,000 feet in the east and rises 300 to 400 feet above the Central Basin which is a rolling plain of about 600 feet average elevation, but with a crescent of hills reaching to over 1,000 feet south of Nashville. This region is defined as Division 3 (Middle Tennessee). The Cumberland Plateau, with an average elevation of 2,000 feet extends roughly northeast-southwest across the state in a belt 30 to 50 miles wide, being bounded on the west by the Highland Rim and overlooking the Great Valley of East Tennessee on the east. This region is defined as Division 2 (Cumberland Plateau). The Great Valley, paralleling the Plateau to the west and the Great Smoky Mountains to the east, is a funnel-shaped valley varying in width from about 30 miles in the south to about 90 miles in the north. Within the valley, which slopes from 1,500 feet in the north to 700 feet in the south, is a series of northeast-southwest ridges. Along the Tennessee-North Carolina border lie the Great Smoky Mountains, the most rugged and elevated portion of Tennessee, with numerous peaks from 4,000 to 6,000 feet. This region is defined as Division 4 (East Tennessee).

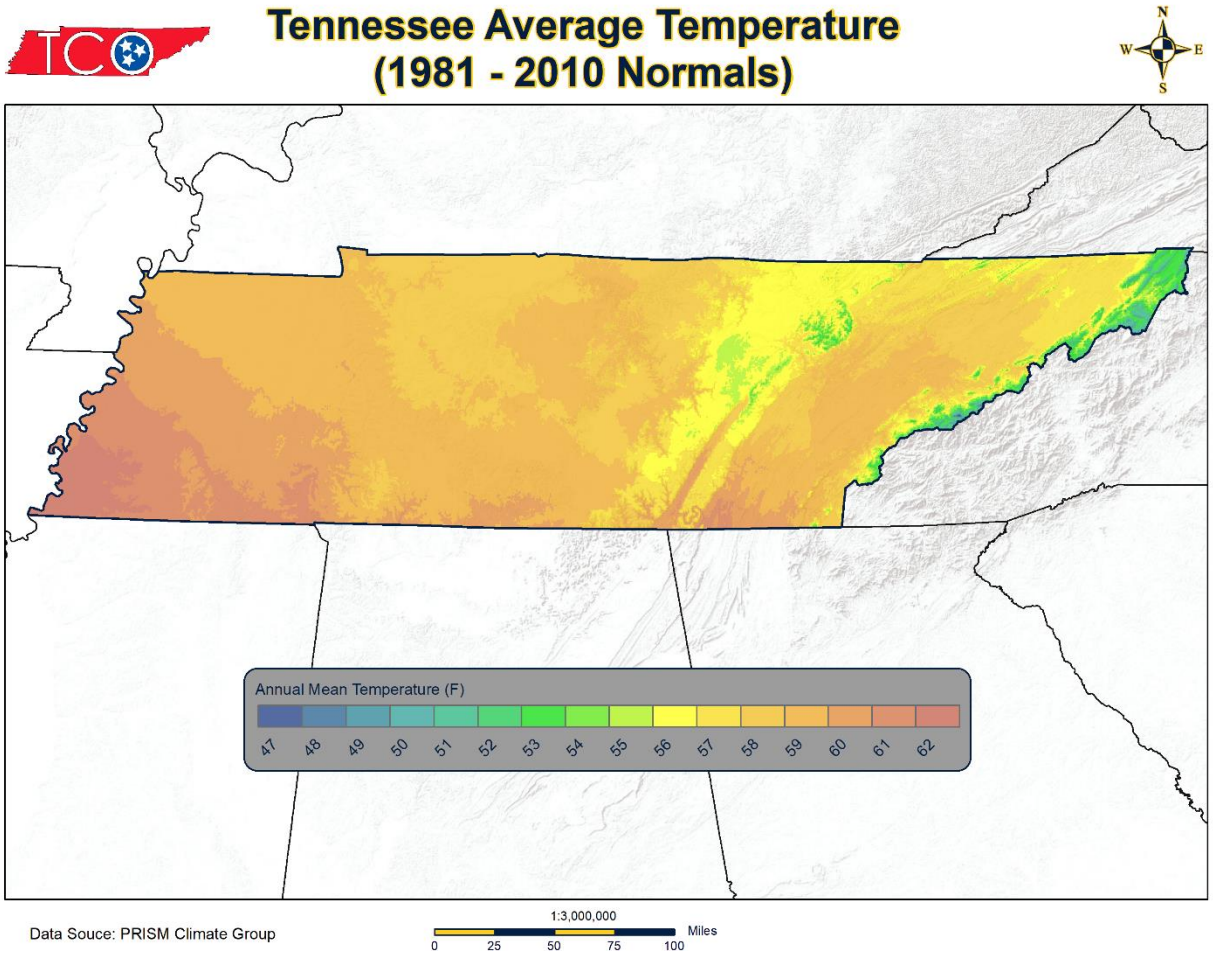
Tennessee, except for a small area east of Chattanooga, lies entirely within the drainage of the Mississippi River system. The extreme western section of the state is drained through several relatively small rivers directly into the Mississippi River. Otherwise, drainage is into either the Cumberland or Tennessee Rivers, both of which flow northward near the end of their courses to join the Ohio River along the Kentucky-Illinois border. The Cumberland River, which drains north-central portions of Tennessee, rises in the Cumberland Mountains in Kentucky, flows southwestward, then south into Tennessee reaching the Nashville area before tuning northward to re-enter Kentucky. The Tennessee River is formed by the juncture of the Holston and French Broad rivers at Knoxville. It

flows southwesterly along the Alabama-Mississippi line, and then flows northward across the state into Kentucky. Besides the headwater streams, other important tributaries include the Clinch, Nolichucky, Watauga, Little Tennessee, Hiawassee, Elk, Duck, Obion, and Hatchie Rivers.

Temperature - Most aspects of the state's climate are related to the widely varying topography within its borders. The decrease of temperature with elevation is quite apparent, amounting to, on average, three degrees Fahrenheit (°F) per 1,000 feet increase in elevation. Thus, higher portions of the state, such as the Cumberland Plateau and the mountains of the east, have lower average temperature than the Great Valley of East Tennessee, which they flank, and other lower parts of the state. In the Great Valley temperature increases from north to south, reaching a value at the south end comparable to that of Middle and West Tennessee where elevation variations are a generally minor consideration. Across the state, the average annual temperature varies from over 62° F in the extreme southwest to near 46° F atop the highest peaks of the east. It is of interest to note that average January temperature atop a 6,000-foot peak in the Great Smoky Mountains (e.g., Mt. LeConte) is equivalent to that in Central Ohio, while average July temperature is comparable to the southern edge of the Hudson Bay in Canada. While most of the state has warm, humid summers and mild winters, this must be qualified to include variations with elevation. Thus, with increasing elevation, summers become cooler and more pleasant while winters become colder with increasing winds and dangerous snowfall events. Most of Tennessee is in the Humid Subtropical climate type, while higher elevations are in the Oceanic/Highland climate type. Extremely small areas over 6,000' in elevation may be considered part of the Humid Continental (Dfb) climate type.



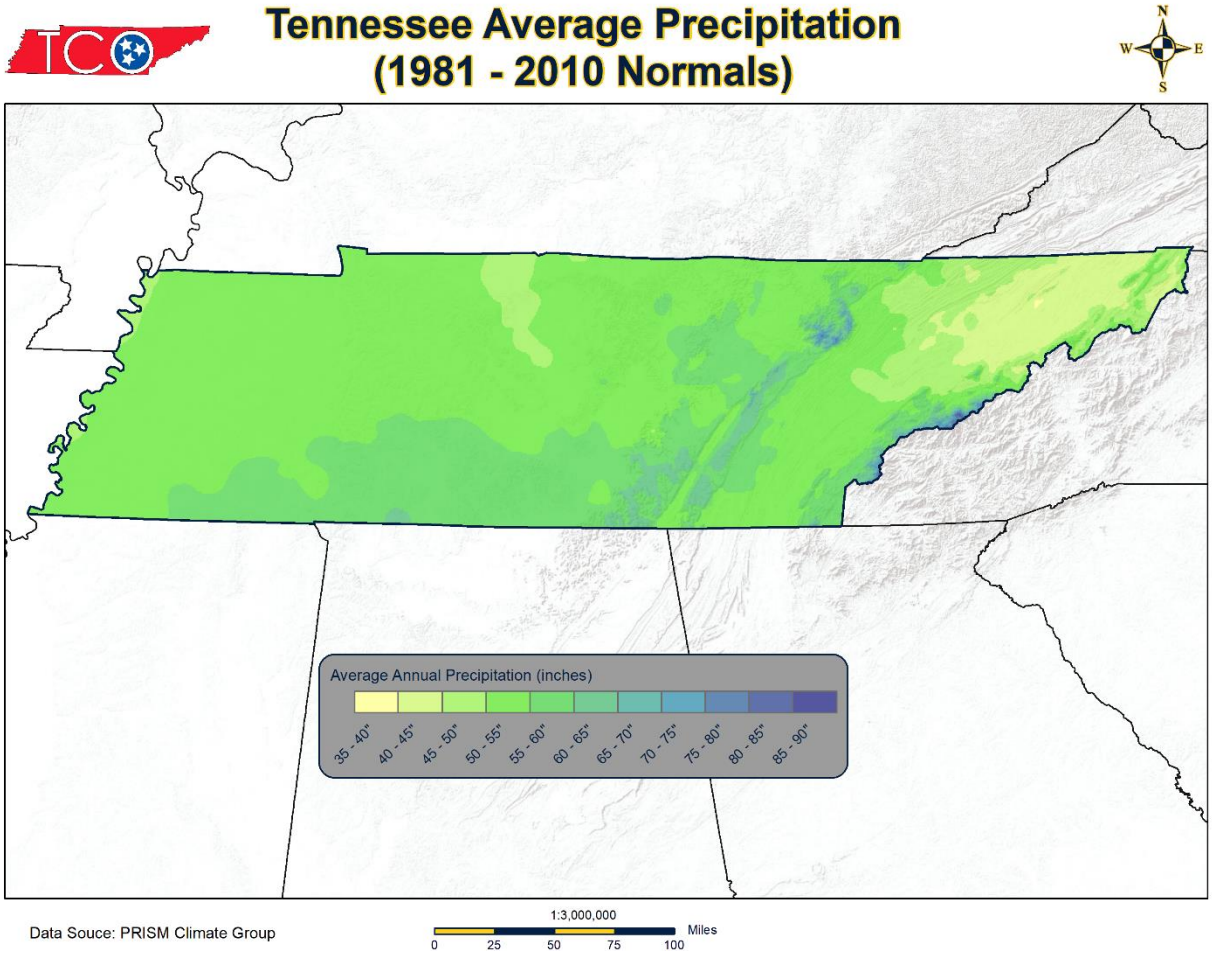
This dependence of temperature on elevation is of considerable importance to a variety of interests. Temperature, together with precipitation, plays an important role in determining what plant and animal life are adaptable to the area. In the Great Smoky Mountains, for example, the variations in elevation from 1,000 to 6,000 feet with attendant variations in temperature contribute to a remarkable variety of plant life. You can explore plant hardiness zones in Tennessee using the USDA Interactive Map. There are currently six zones in Tennessee (5b, 6a, 6b, 7a, 7b, and 8a). The relative coolness of the mountains also contributes to the popularity of that area during the warmer part of the year.



Length of growing season is linked to topography in a way like temperature, varying from an average of 237 days at low-lying Memphis to a near 130 days on the highest mountains in the east. Most of the state is included in the range of 180 to 220 days. Shorter growing seasons than this are confined to the mountains forming the state's eastern border and to the northern part of the Cumberland Plateau. Longer growing seasons are found in counties bordering the Mississippi River, parts of the Central Basin of the Middle Tennessee, and the southern end of the Great Valley of East Tennessee (around Chattanooga).

Precipitation - Since the principal source of moist air for this area is the Gulf of Mexico, there exists a gradual decrease of average precipitation from south to north. This effect is largely obscured, however, by the overruling influence of topography. Air forced to ascend, cools and condenses out a portion of its moisture. Thus, average

precipitation in West Tennessee ranges from 46 to 54 inches, increasing from Mississippi bottomlands to the slight hills farther east. In Middle Tennessee, the variation is from a minimum of 45 inches in the Central Basin to 50 to 55 inches in the surrounding hilly Highland Rim. Over the elevated Cumberland Plateau, average annual precipitation is generally from 50 to 55 inches. In contrast, average annual precipitation in the Great Valley of East Tennessee increases from near 40 inches in northern portions to over 50 inches in the south. The northern minimum, lowest for the entire state, results from the shielding influence of the Great Smoky Mountains to the southeast and the Cumberland Plateau to the northwest. The mountainous eastern border of the state is the wettest, having average annual precipitation ranging up to 80+ inches on the higher, and well-exposed peaks of the Great Smoky Mountains.



Over most of the state, the greatest precipitation occurs during the winter and early spring due to the more frequent passage of large-scale storms over and near the state during those months. A secondary maximum of precipitation occurs in midsummer in response to thunderstorm activity. This is especially pronounced in the mountains of the east where July rainfall exceeds the precipitation of any other month. Lightest precipitation, observed in the fall, is brought about by the prevalence of slow moving, rain suppressing high pressure areas. Although all parts of Tennessee are generally well supplied with precipitation, there occurs on the average one or more prolonged dry spells each year during summer and fall. Studies illustrate the beneficial effects of supplemental irrigation of crops,

despite usually bountiful annual precipitation. Irrigation can be especially important during 'flash drought' events, which occur from time to time and can have major agricultural and economic impacts.

Average annual snowfall varies from four to six inches in the southern and western parts of the state and in most of the Great Valley of East Tennessee to more than 10 inches over the northern Cumberland Plateau and the mountains of the east. Mt. LeConte (6,594'), on average, receives ~75 inches of snowfall each year, although some years receive over 100 inches of snowfall. Over most of the state, due to relatively mild winter temperatures, snow cover rarely persists for more than a few days.

The most important flood season is during the winter and early spring when frequent low-pressure systems bring general rains of high intensity. During this period both widespread flooding and local flash floods can occur. During the summer, heavy thunderstorm rainfalls frequently result in local flash flooding. In the fall, while flood-producing rains are rare, a substantial tropical system on occasion causes serious floods. The numerous dams constructed along the Tennessee and Cumberland rivers are major features in the control of floodwaters in the state.

The dams of the Tennessee and Cumberland River systems and associated lakes, in addition to vastly reducing flood damage have facilitated water transportation, provide abundant low-cost hydroelectric power, and create extensive recreation areas. Fishing, boating, swimming, and camping along the many lakes, together with the several state and national parks/forests/wildlife management areas, make tourism one of the major industries in the state.

Climate and the Economy - Water resources of Tennessee have been a major factor in the state's industrial growth. The bountiful and good quality water supply influenced the location of industry, especially chemical processing plants. Three major waterways, the Mississippi, Cumberland, and Tennessee Rivers, are suitable for commercial traffic. Finally, the availability of low-cost hydroelectric power from the multipurpose dams of the Cumberland and Tennessee rivers and tributaries spurs industry of all types. The principal types of manufacturing products are textile mill products, primary metals, fabricated metals, and lumber products.

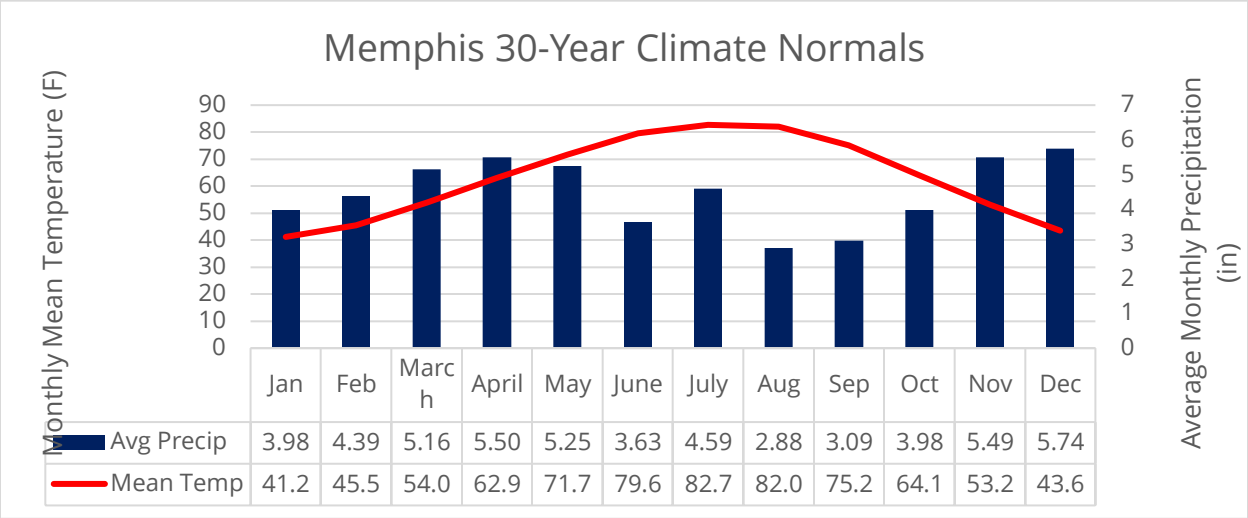
Although surpassed in monetary value by industrial activity, agriculture remains a vital feature of Tennessee's economic life. The wide range of climates and environments in Tennessee, from river bottom to mountaintop, coupled with a wide range of soils, has resulted in many crops that thrive in the state.

Forests represent an additional important segment of Tennessee's natural resources related to the climate of the state. Timberland, containing principally hardwood types, covers approximately one-half of the total area of Tennessee. This has led to a highly diversified woodworking industry and made the area around Memphis the center of production for wood flooring. The temperate climate of the state is very favorable for logging operations, allowing full-scale activity during nine months of the year and to a lesser extent during the winter months.

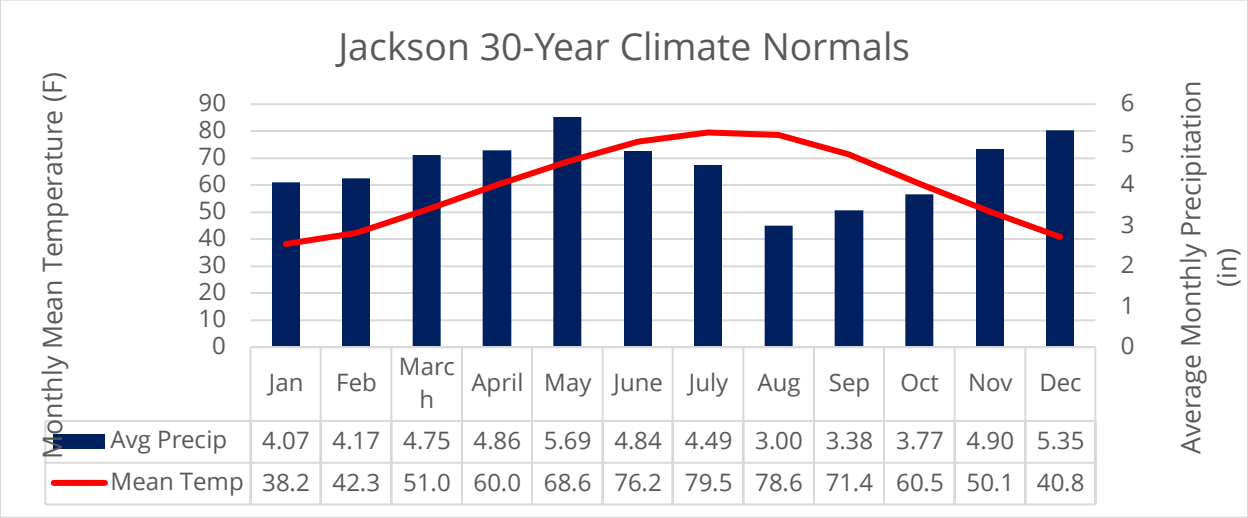
Climate descriptions of Tennessee - Generally, Tennessee has a temperate climate, with warm summers and mild winters. However, the state's varied topography leads to a wide range of climatic conditions.

The warmest parts of the state, with the longest growing season, are the Gulf Coastal Plain, the Central Basin, and the Sequatchie Valley. In the Memphis area in the southwest, the median date of the last killing frost is March 22, and the growing season is about 235 days. Memphis has an annual mean temperature of 63°F (17°C), 41°F (4°C) in January and 83°F (28°C) in July. In the Nashville area, the median date of the last killing frost is April 6, and the growing season lasts about 204 days. Nashville has an annual mean of 59°F (15°C), ranging from 38°F (3°C) in January to 79°F (26°C) in July. In the Knoxville area the median last killing frost is April 6, and the growing season lasts about 211 days. The city's annual mean temperature is 59°F (15°C), with averages of 38°F (3°C) in January and 78°F (26°C) in July. In some parts of the mountainous east, where the temperatures are considerably lower, the growing season is as short as 130 days. To explore additional frost/freeze data Click Here. The record high temperature for the state is 113°F (45°C), set at Perryville on 9 August 1930; the record low, −32°F (−36°C), was registered at Mountain City on 30 December 1917. A selection of climographs developed using long-term climate

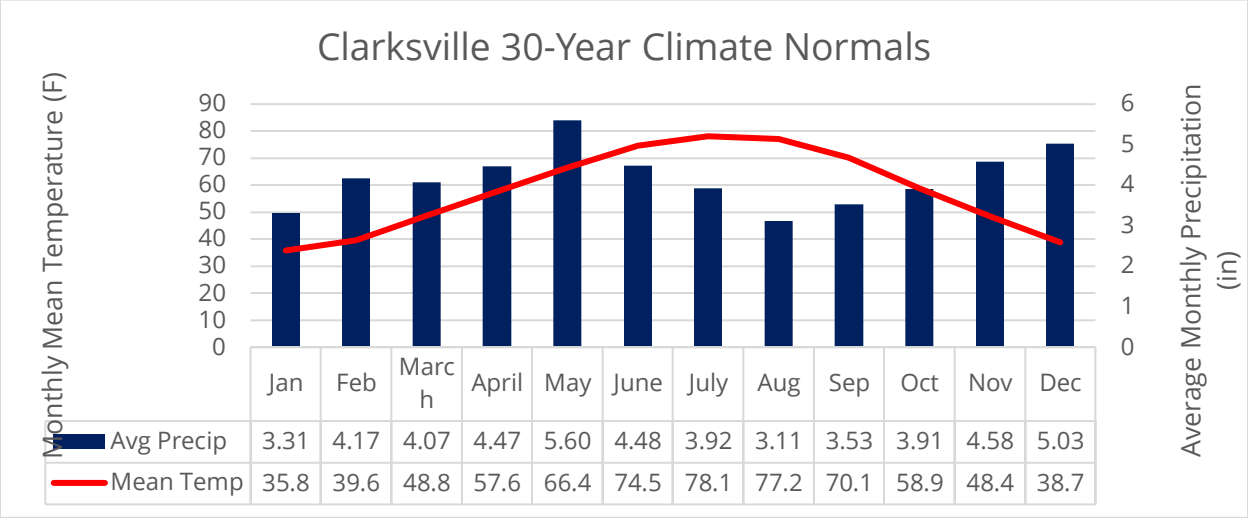
data, where available, can be viewed below. These include Memphis, Jackson, Clarksville, Nashville, Chattanooga, Crossville, Knoxville, and Bristol (the Tri-Cities).



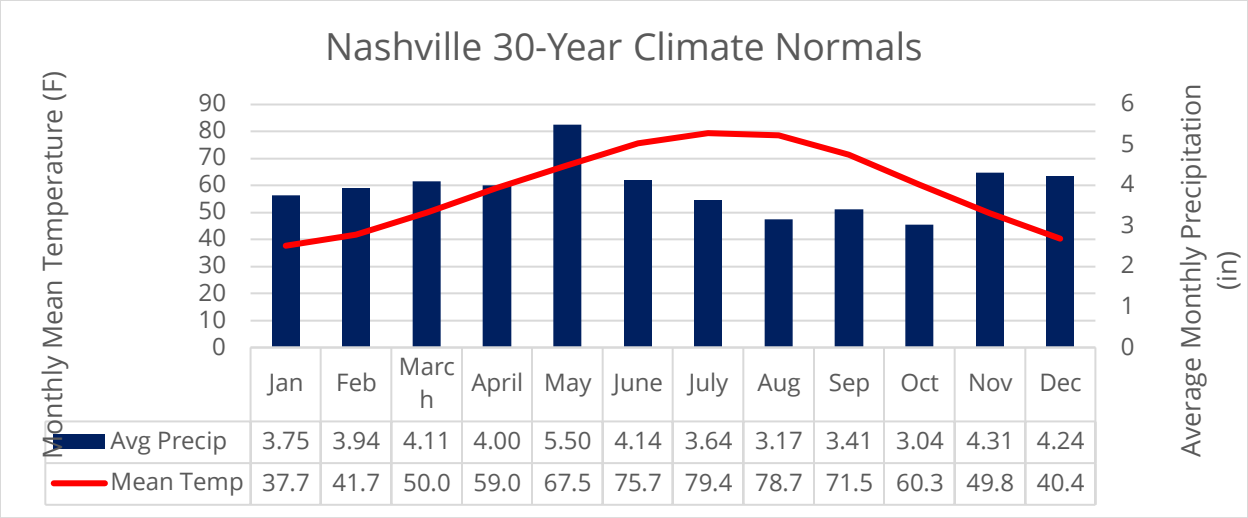
	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	3.98	4.39	5.16	5.50	5.25	3.63	4.59	2.88	3.09	3.98	5.49	5.74
Mean Temp	41.2	45.5	54.0	62.9	71.7	79.6	82.7	82.0	75.2	64.1	53.2	43.6



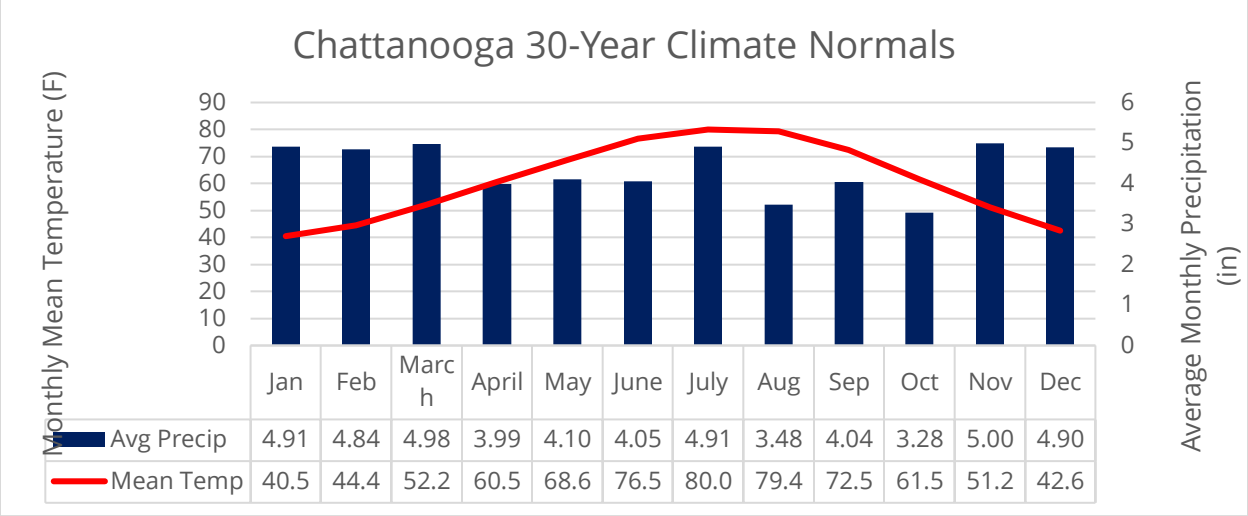
	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	4.07	4.17	4.75	4.86	5.69	4.84	4.49	3.00	3.38	3.77	4.90	5.35
Mean Temp	38.2	42.3	51.0	60.0	68.6	76.2	79.5	78.6	71.4	60.5	50.1	40.8



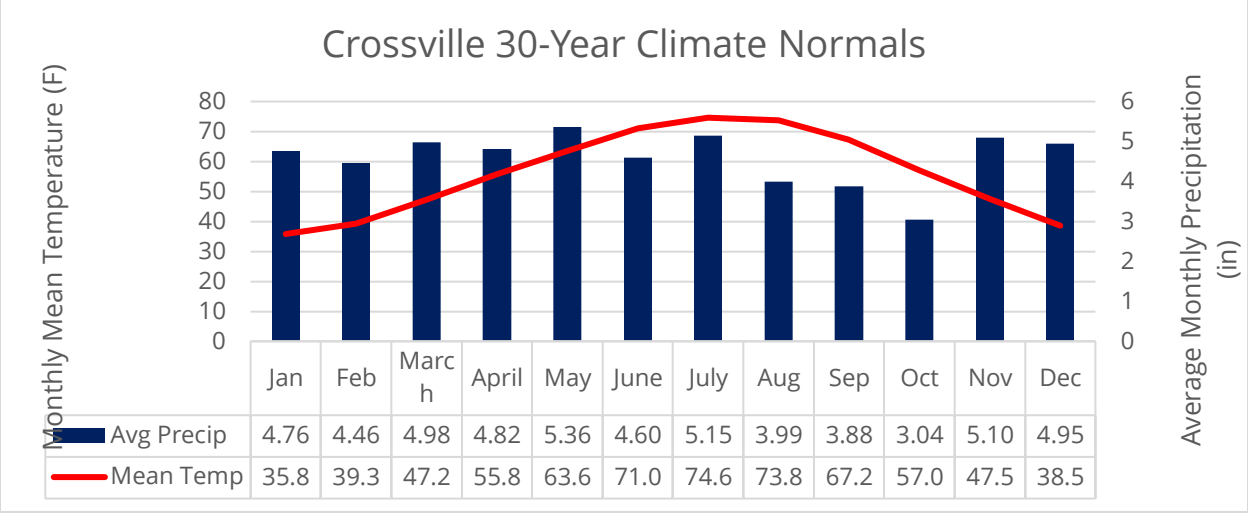
	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	3.31	4.17	4.07	4.47	5.60	4.48	3.92	3.11	3.53	3.91	4.58	5.03
Mean Temp	35.8	39.6	48.8	57.6	66.4	74.5	78.1	77.2	70.1	58.9	48.4	38.7



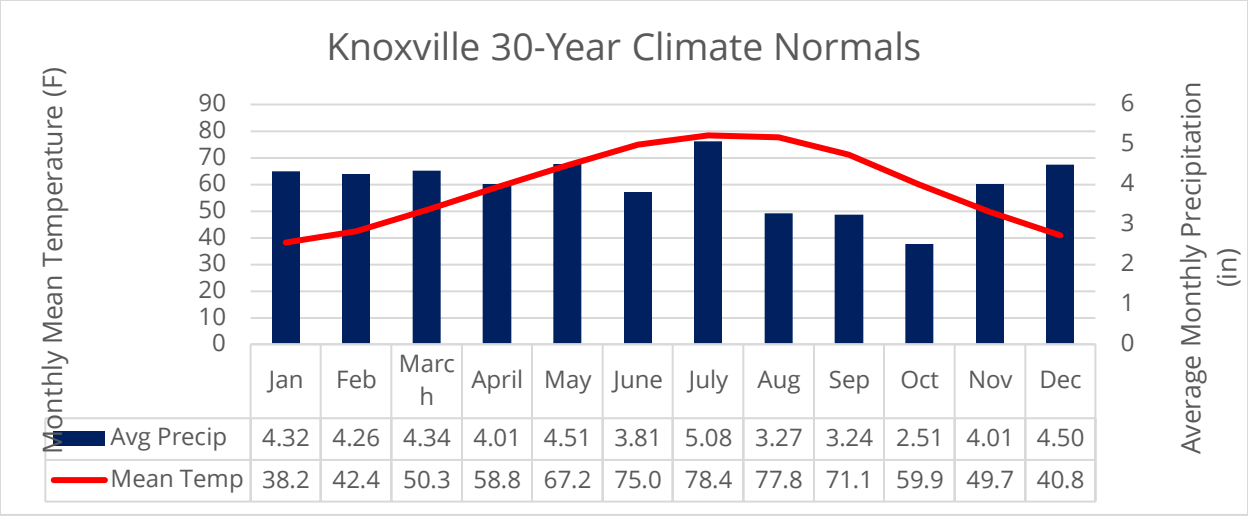
	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	3.75	3.94	4.11	4.00	5.50	4.14	3.64	3.17	3.41	3.04	4.31	4.24
Mean Temp	37.7	41.7	50.0	59.0	67.5	75.7	79.4	78.7	71.5	60.3	49.8	40.4

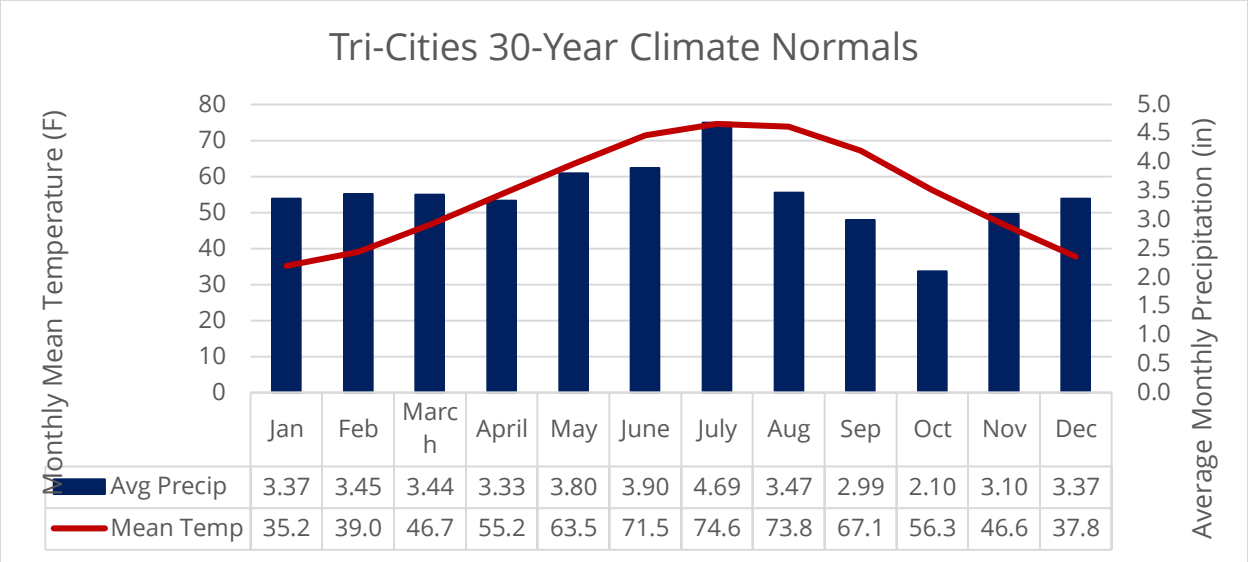


	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	4.91	4.84	4.98	3.99	4.10	4.05	4.91	3.48	4.04	3.28	5.00	4.90
Mean Temp	40.5	44.4	52.2	60.5	68.6	76.5	80.0	79.4	72.5	61.5	51.2	42.6



	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Precip	4.76	4.46	4.98	4.82	5.36	4.60	5.15	3.99	3.88	3.04	5.10	4.95
Mean Temp	35.8	39.3	47.2	55.8	63.6	71.0	74.6	73.8	67.2	57.0	47.5	38.5





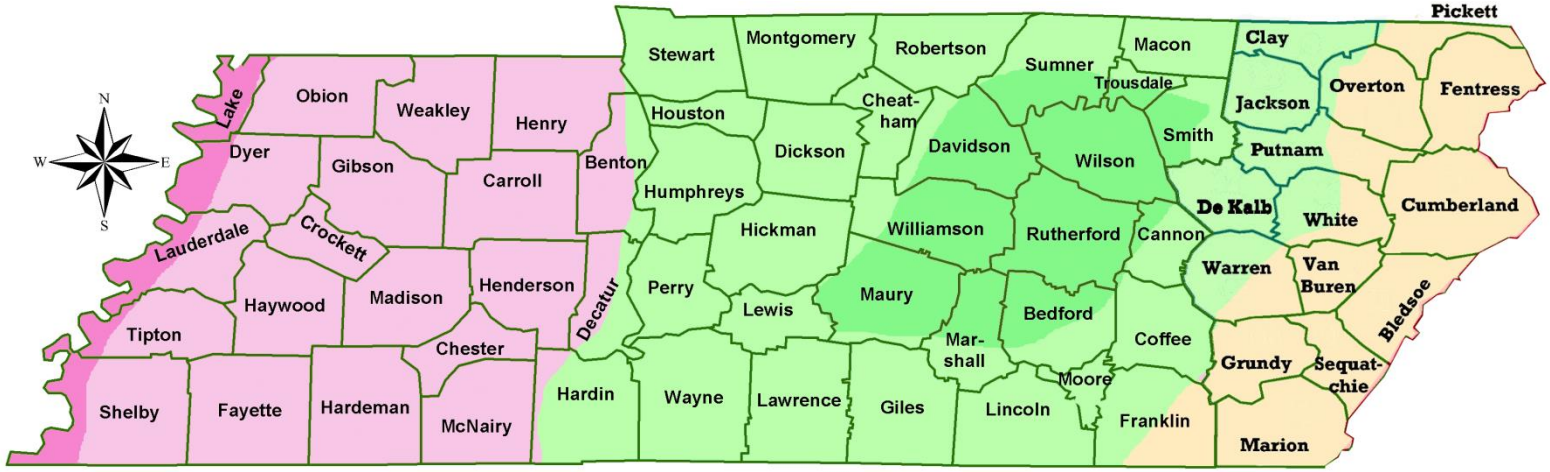
Source:

East Tennessee State University > Tennessee Climate Office > Tennessee Climatology

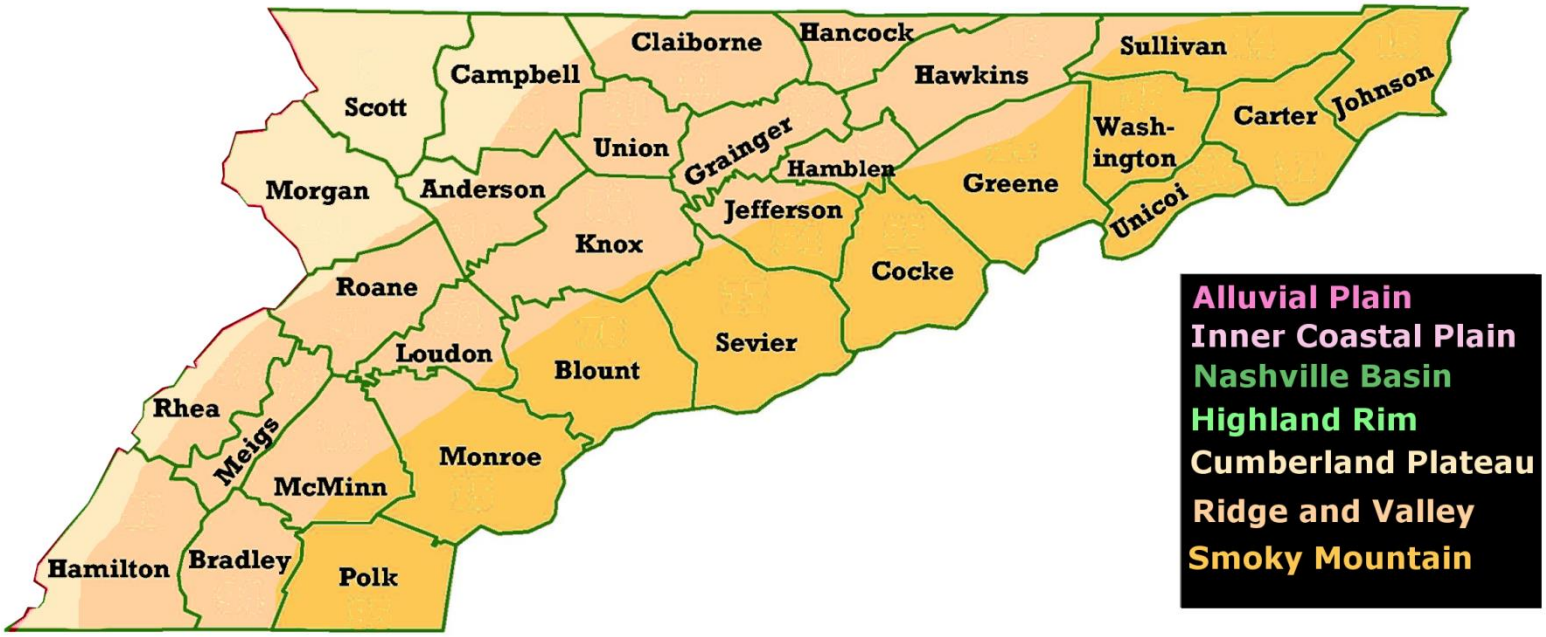
https://www.etsu.edu/cas/geosciences/tn-climate/tn-climatology.php

Map of Tennessee Geographic Regions

Central Time Zone Regions (CST UTC-6:00, CDT UTC-5:00)



Eastern Time Zone Regions (CST UTC-5:00, CDT UTC-4:00)



3-Yr (2019-2021) Wind Rose Data for 10 TN Area ASOS Stations

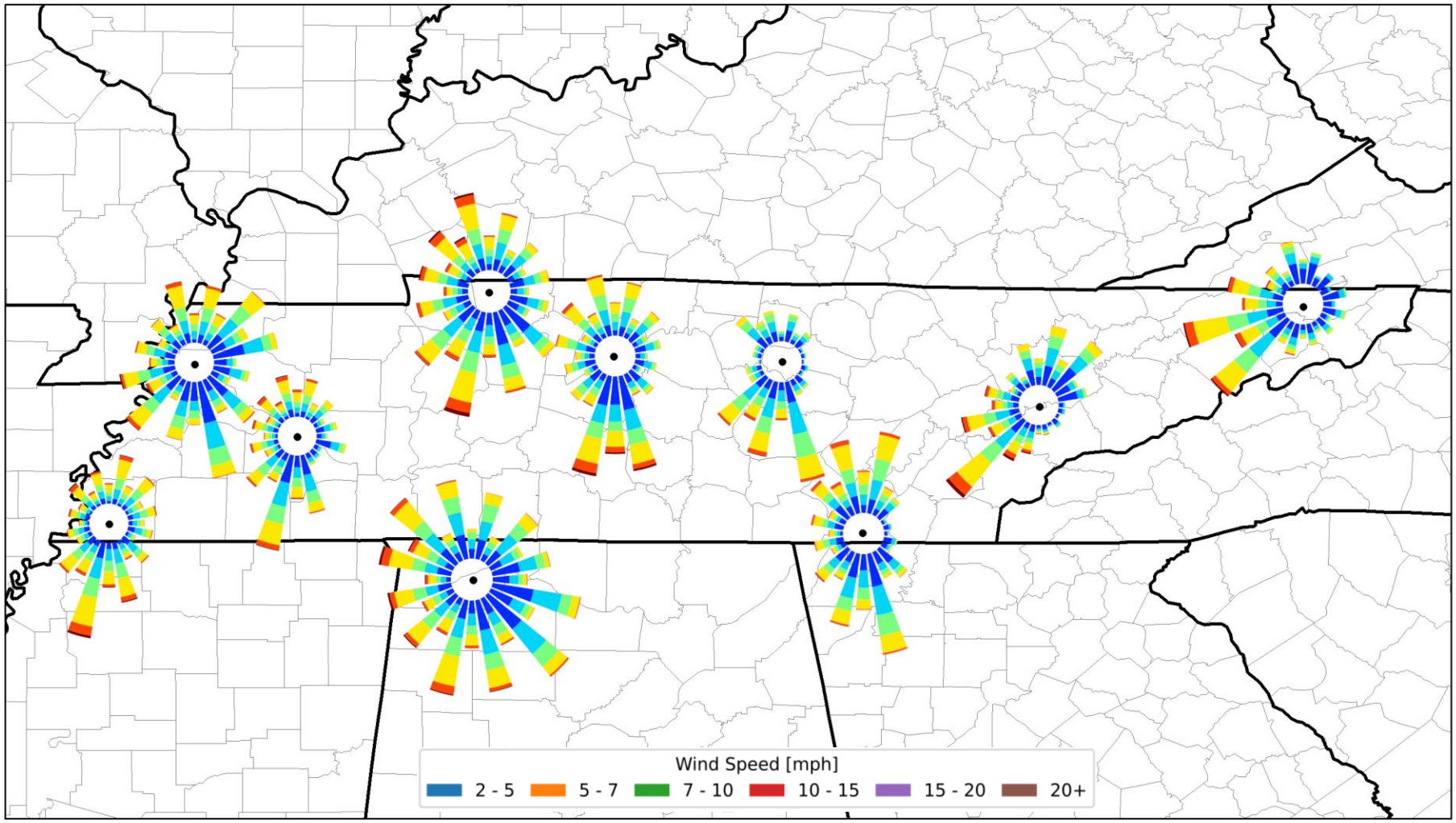


Table 2: Tennessee Metropolitan Statistical Areas and Population Estimates

Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the State of Tennessee: April 1, 2020 to July 1, 2022				
Geographic Area	**April 1, 2020 Estimates Base**	**Population Estimate**		
		2020	**2021**	**2022**
Chattanooga, TN-GA Metro Area	562,647	563,599	567,641	574,507
Clarksville, TN-KY Metro Area	320,535	321,607	328,304	336,605
Cleveland, TN Metro Area	126,164	126,310	127,938	128,479
Jackson, TN Metro Area	180,504	180,383	180,799	181,579
Johnson City, TN Metro Area	207,285	207,262	208,068	210,256
Kingsport-Bristol, TN-VA Metro Area	307,614	307,406	308,661	311,272
Knoxville, TN Metro Area	879,773	881,628	893,412	907,968
Memphis, TN-MS-AR Metro Area	1,337,779	1,337,311	1,336,103	1,332,305
Morristown, TN Metro Area	142,709	142,830	143,855	146,172
Nashville-Davidson--Murfreesboro--Franklin, TN Metro Area	1,989,519	1,995,343	2,012,476	2,046,828

Source Link: Census.gov

Table 3: Tennessee Micropolitan Statistical Areas and Population Estimates

Annual Estimates of the Resident Population for Micropolitan Statistical Areas in the United States and				
Geographic Area	April 1, 2020 Estimates Base	Population Estimate		
		2020	2021	2022
Athens, TN Micro Area	53,276	53,315	54,059	54,719
Brownsville, TN Micro Area	17,864	17,795	17,694	17,550
Cookeville, TN Micro Area	113,982	114,187	115,777	117,415
Crossville, TN Micro Area	61,145	61,272	62,451	63,522
Dayton, TN Micro Area	32,870	32,903	33,136	33,730
Dyersburg, TN Micro Area	36,801	36,646	36,615	36,410
Greeneville, TN Micro Area	70,152	70,220	70,621	71,405
Lawrenceburg, TN Micro Area	44,159	44,189	44,828	45,415
Lewisburg, TN Micro Area	34,318	34,441	34,984	35,878
Martin, TN Micro Area	32,902	32,864	33,036	33,063
McMinnville, TN Micro Area	40,953	41,023	41,523	42,026
Newport, TN Micro Area	35,999	36,022	36,418	36,879
Paris, TN Micro Area	32,199	32,115	32,239	32,379
Sevierville, TN Micro Area	98,380	98,497	99,517	98,789
Shelbyville, TN Micro Area	50,237	50,302	51,119	51,950
Tullahoma-Manchester, TN Micro Area	107,124	107,340	108,891	110,412
Union City, TN Micro Area	30,787	30,716	30,466	30,394

Source Link: Census.gov

Table 4: Tennessee County Population Data Trends

(Estimates Based on 2020 by US Census Bureau)

Tennessee	Population Estimate (as of July 1)		
	2020	2021	2022
	6,910,786	**6,968,351**	**7,051,339**
Anderson County, Tennessee	77,136	77,567	78,913
Bedford County, Tennessee	50,239	51,157	51,950
Benton County, Tennessee	15,863	15,839	16,002
Bledsoe County, Tennessee	14,916	14,844	14,798
Blount County, Tennessee	135,283	137,649	139,958
Bradley County, Tennessee	108,620	109,769	110,616
Campbell County, Tennessee	39,277	39,409	39,584
Cannon County, Tennessee	14,512	14,535	14,788
Carroll County, Tennessee	28,434	28,287	28,458
Carter County, Tennessee	56,349	56,060	56,410
Cheatham County, Tennessee	41,065	41,547	41,830
Chester County, Tennessee	17,348	17,479	17,609
Claiborne County, Tennessee	32,038	32,146	32,431
Clay County, Tennessee	7,580	7,572	7,620
Cocke County, Tennessee	35,998	36,370	36,879
Coffee County, Tennessee	57,882	58,933	59,728
Crockett County, Tennessee	13,909	13,993	13,888
Cumberland County, Tennessee	61,152	62,431	63,522
Davidson County, Tennessee	715,875	703,372	708,144
Decatur County, Tennessee	11,442	11,413	11,564
DeKalb County, Tennessee	20,078	20,478	21,003
Dickson County, Tennessee	54,314	55,174	55,761

Dyer County, Tennessee	36,803	36,586	36,410
Fayette County, Tennessee	42,002	42,899	43,630
Fentress County, Tennessee	18,489	18,837	19,332
Franklin County, Tennessee	42,769	43,247	43,942
Gibson County, Tennessee	50,409	50,537	50,837
Giles County, Tennessee	30,344	30,403	30,554
Grainger County, Tennessee	23,527	23,833	24,277
Greene County, Tennessee	70,152	70,603	71,405
Grundy County, Tennessee	13,525	13,586	13,783
Hamblen County, Tennessee	64,500	64,390	65,168
Hamilton County, Tennessee	366,215	369,027	374,682
Hancock County, Tennessee	6,659	6,777	6,845
Hardeman County, Tennessee	25,460	25,276	25,529
Hardin County, Tennessee	26,829	26,878	27,077
Hawkins County, Tennessee	56,718	57,257	58,043
Haywood County, Tennessee	17,862	17,715	17,550
Henderson County, Tennessee	27,841	27,916	27,929
Henry County, Tennessee	32,197	32,250	32,379
Hickman County, Tennessee	24,909	25,085	25,455
Houston County, Tennessee	8,281	8,282	8,219
Humphreys County, Tennessee	18,992	19,200	19,106
Jackson County, Tennessee	11,619	11,777	11,989
Jefferson County, Tennessee	54,679	55,562	56,727
Johnson County, Tennessee	17,950	18,056	18,086
Knox County, Tennessee	478,981	486,812	494,574
Lake County, Tennessee	7,004	6,597	6,507
Lauderdale County, Tennessee	25,139	24,922	24,793

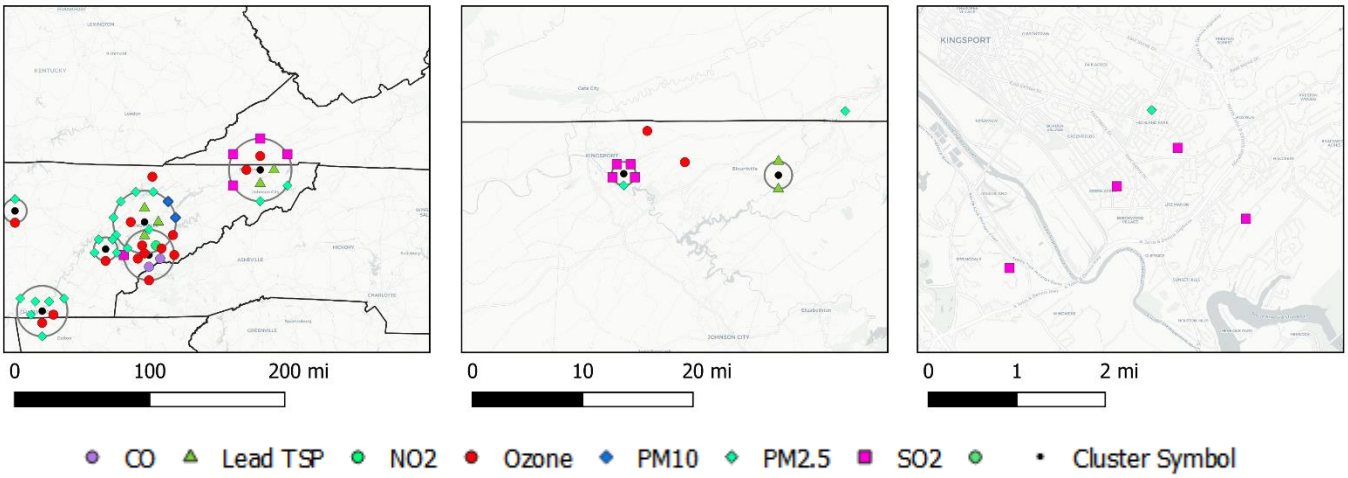
Lawrence County, Tennessee	44,163	44,729	45,415
Lewis County, Tennessee	12,581	12,854	12,957
Lincoln County, Tennessee	35,326	35,451	36,004
Loudon County, Tennessee	54,887	56,672	58,181
McMinn County, Tennessee	53,275	53,907	54,719
McNairy County, Tennessee	25,859	25,854	25,988
Macon County, Tennessee	25,215	25,682	26,229
Madison County, Tennessee	98,843	98,585	99,245
Marion County, Tennessee	28,835	28,927	29,094
Marshall County, Tennessee	34,320	35,032	35,878
Maury County, Tennessee	100,975	105,003	108,159
Meigs County, Tennessee	12,755	13,029	13,272
Monroe County, Tennessee	46,249	46,668	47,740
Montgomery County, Tennessee	219,994	227,841	235,201
Moore County, Tennessee	6,469	6,652	6,742
Morgan County, Tennessee	21,027	21,101	21,224
Obion County, Tennessee	30,788	30,498	30,394
Overton County, Tennessee	22,514	22,856	23,044
Perry County, Tennessee	8,381	8,473	8,685
Pickett County, Tennessee	5,006	5,082	5,107
Polk County, Tennessee	17,547	17,784	17,863
Putnam County, Tennessee	79,844	81,255	82,382
Rhea County, Tennessee	32,870	33,205	33,730
Roane County, Tennessee	53,393	54,056	55,082
Robertson County, Tennessee	72,803	74,088	75,470
Rutherford County, Tennessee	341,481	351,202	360,619
Scott County, Tennessee	21,852	21,895	22,035
Sequatchie County, Tennessee	15,829	16,445	16,909
Sevier County, Tennessee	98,391	99,435	98,789
Shelby County, Tennessee	929,722	923,352	916,371

Smith County, Tennessee	19,914	20,181	20,489
Stewart County, Tennessee	13,662	13,830	14,035
Sullivan County, Tennessee	158,161	159,167	160,820
Sumner County, Tennessee	196,281	200,582	203,858
Tipton County, Tennessee	60,979	61,049	61,656
Trousdale County, Tennessee	11,610	11,619	12,111
Unicoi County, Tennessee	17,924	17,667	17,674
Union County, Tennessee	19,802	19,996	20,452
Van Buren County, Tennessee	6,168	6,277	6,429
Warren County, Tennessee	40,951	41,529	42,026
Washington County, Tennessee	133,005	133,525	136,172
Wayne County, Tennessee	16,232	16,336	16,308
Weakley County, Tennessee	32,902	32,870	33,063
White County, Tennessee	27,356	27,557	28,064
Williamson County, Tennessee	247,733	256,209	260,815
Wilson County, Tennessee	147,747	152,010	158,555

County Population Totals: 2020-2022 (census.gov); Index of /programs-surveys/popest/datasets (census.gov)

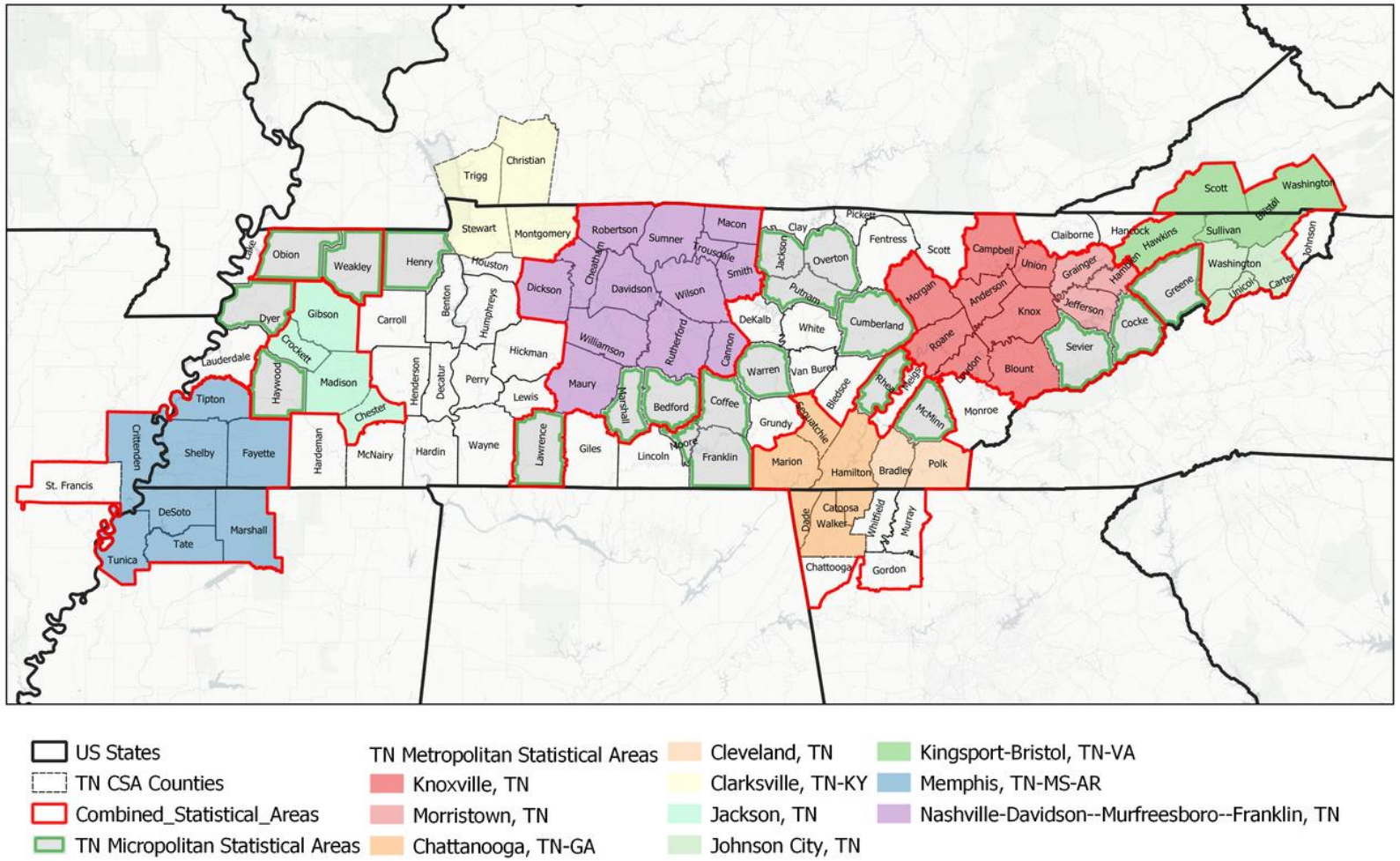
The following maps depict the most recent statistical area boundaries. The first map groups metropolitan and micropolitan areas by their combined statistical area (CSA) and shades the areas accordingly.

The second map depicts the metropolitan area boundaries (dashed lines) and groups all the active air quality monitors together in clusters. Due to the difficulty in plotting sites with multiple pollutants and sites that are located in close proximity, the monitors are displayed using the cluster method, where all monitors in an area are grouped together and concentric rings plot the symbols of each monitor by the pollutant they measure around the group's centroid. The outer ring represents the area of monitors being grouped. The example below shows this concept at multiple scales.

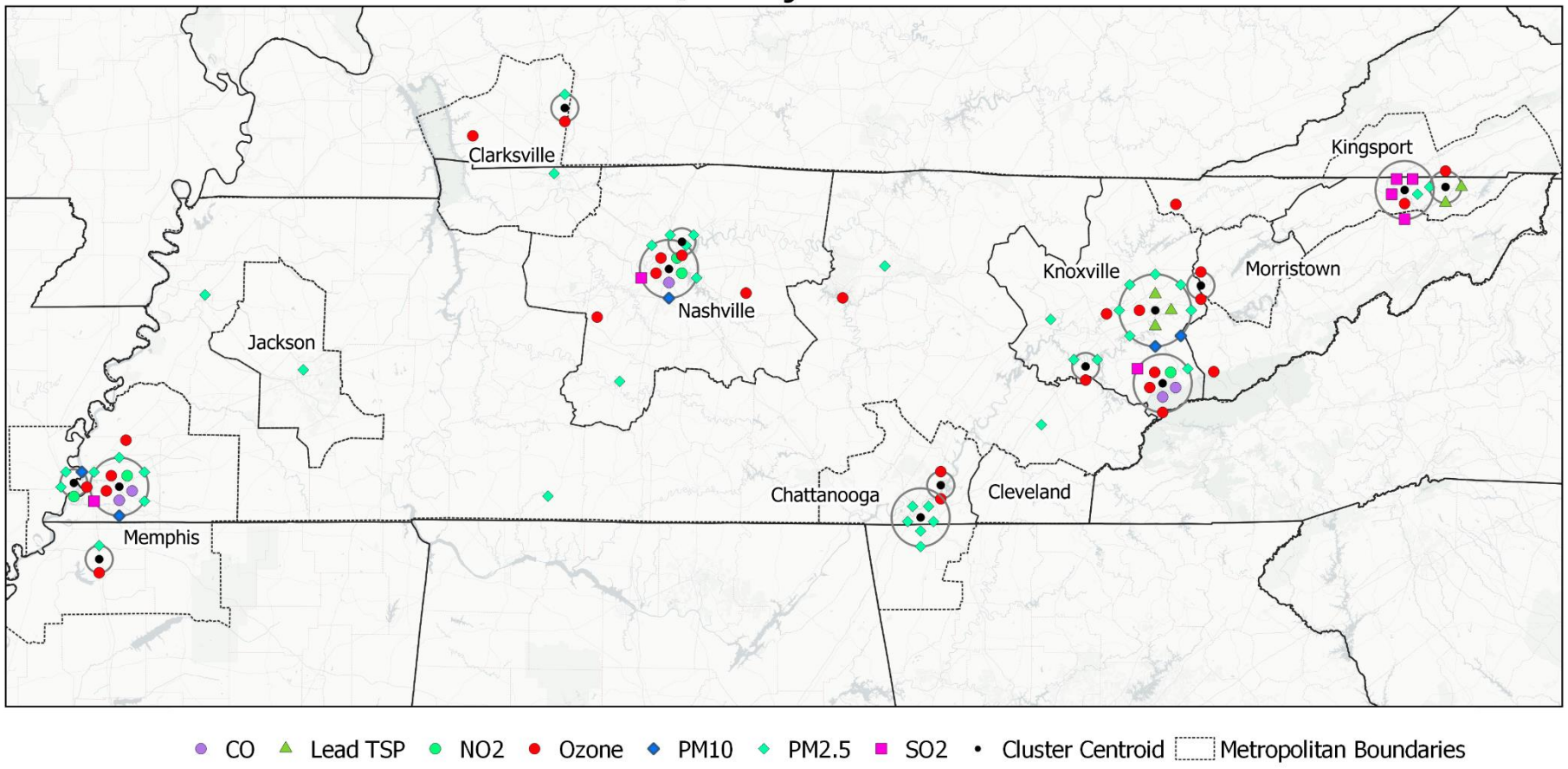


Combined/Metropolitan/Micropolitan Statistical Areas of Tennessee

September 2020



TN Area Air Quality Monitor Clusters



Appendix A DAPC Monitoring Equipment Evaluation 2021

Location	Make	Description	Condition
Exide	Tisch	HiVol TSP/Lead (Tisch Housing)	Good
Exide	Tisch	HiVol variable oriface (Kit #9-no tag)	Good
Exide	Tisch	HiVol TSP/Lead (Tisch Housing-9760)	Good
Nashville EFO	Tisch	HiVol TSP/Lead (Tisch Housing-8626)	Good
Nashville EFO	Teledyne	T703 Reference (level2)	Good
Freels Bend	Agilaire	Data logger (8872-532)	Good
New Market	Agilaire	Data logger (8872-513)	Good
Loudon	Agilaire	Data logger (8872-519)	Good
Blountville	Agilaire	Data logger (8872-512)	Good
Skyland Dr.	Agilaire	Data logger (8872-510)	Good
Cedars	Agilaire	Data logger (8872-516)	Good
Ross N Robinson	Agilaire	Data logger (8872-515)	Good
Hendersonville	Agilaire	Data logger (8872-534)	Good
Fairview	Agilaire	Data logger (8872-517)	Good
Nashville EFO	Agilaire	Data logger (8872-533)	Good
Nashville EFO	Agilaire	Data logger (8872-518)	Good
Nashville EFO	Agilaire	Data logger (8872-465)	Good
Nashville EFO	Agilaire	Data logger (8872-514)	Good
Nashville EFO	Agilaire	data logger (8872-1048)	Good
Nashville EFO	Agilaire	data logger (8872-1047)	Good
Happy Hill	Agilaire	Data logger (8872-494)	Good
AJ Elementary	Agilaire	Data logger (8872-511)	Good
Nashville EFO	BGI	Flow Check Device (Challenger-175)	Good
Nashville EFO	BGI	Flow Check Device (TetraCal-161)	Good
Nashville EFO	BGI	Flow Check Device (TetraCal)	Good
Nashville EFO	BGI	Flow Check Device (Tetracal-576)	Good
Nashville EFO	BGI	Flow Check Device (Tetracal-582)	Good
Nashville EFO	Chevrolet	Compliance Validation Vehicle	Good
Dyersburg	Chinook Engineering	Streamline Pro-CU03031	Good
Columbia	Chinook Engineering	Streamline Pro-CU03036	Good
Cookeville	Chinook Engineering	Streamline Pro-C160202	Good
Kingsport PM25	Chinook Engineering	Streamline Pro-C191205	Good
Knoxville EFO	Chinook Engineering	Streamline Pro-CU03038	Good
Knoxville EFO	Chinook Engineering	Streamline Pro-C191206	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C150304	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C150305	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C150306	Good
Nashville EFO	Chinook Engineering	Streamline Pro-CU02013	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C160203	Good
Nashville EFO	Chinook Engineering	Streamline Pro-CU060504	Good

Nashville EFO	Chinook Engineering	Streamline Pro-CU03040	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C191201	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C191202	Good
Nashville EFO	Chinook Engineering	Streamline Pro-C191203	Good
Nashville EFO	Chinook Engineering	Streamline Pro C191204	Good
Nashville EFO	Chinook Engineering	Streamline Pro C191209	Good
Johnson City EFO	Chinook Engineering	Streamline Pro-C160204	Good
Loretto	Chinook Engineering	Streamline Pro-CU03032	Good
Jackson	Chinook Engineering	Streamline Pro-CU03037	Good
Jackson	Chinook Engineering	Streamline Pro-C191207	Good
Jackson	Chinook Engineering	Streamline Pro-C191208	Good
Clarksville	Chinook Engineering	Streamline Pro-CU03039	Good
Nashville EFO	Climatronics	Weather (Sonic-279)	Good
Nashville EFO	Climatronics	Rain gauge (101156-GO-378)	Good
Nashville EFO	Dresser Instruments	HiVol (Roots meter)	Good
Nashville EFO	Dresser Instruments	HiVol (Roots meter)	Good
Nashville EFO	Environics	Multi-gas calibrator (6100-1106)	Good
Nashville EFO	Environics	Multi-gas calibrator (6103-6371)	Good
Nashville EFO	Environics	Multi-gas calibrator (6103-3081)	Good
Nashville EFO	Environics	Multi-gas calibrator (6103-3253)	Good
Nashville EFO	ESC	Data logger (8832-A4159K)	Good
Nashville EFO	ESC	Data logger (8832-A4158K)	Good
Nashville EFO	ExTech	QA ExTech Manometer	Good
Nashville EFO	ExTech	QA ExTech Manometer	Good
Nashville EFO	Mesa Labs	Multi-Gas Flow Bench Standard	Good
Nashville EFO	Mesa labs	DryCal	Good
Loudon	Met One	FEM (BAM 1022-W17126)	Good
Loudon	Met One	FEM (BAM 1022-W19946)	Good
Hendersonville	Met One	FEM (BAM 1022-C20213)	New
Nashville EFO	Met One	FEM (BAM 1022-W17125)	Good
Maryville	MetOne	FEM (BAM 1022-T17009)	Good
Dyersburg	MetOne	FEM (BAM 1022-C20241)	New
Nashville EFO	MetOne	FEM (BAM 1022-T21582)	Good
Nashville EFO	MetOne	FEM (BAM 1022-T17004)	Good
Columbia	MetOne	FEM (BAM 1022-T17005)	Good
Athens	MetOne	FEM (BAM 1022-T21579)	Good
Cookeville	MetOne	FEM (BAM 1022-C20235)	New
Nashville EFO	MetOne	FEM (BAM 1022-T21580)	Good
Harriman	MetOne	FEM (BAM 1022-C20218)	Good
Nashville EFO	MetOne	FEM (BAM 1022-W19944)	Good
Kingsport PM25	MetOne	FEM (BAM 1022-W17127)	Good
Nashville EFO	MetOne	FEM (BAM 1022-T17016)	Poor
Nashville EFO	MetOne	FEM (BAM 1022-W19942)	Poor
Nashville EFO	MetOne	FEM (BAM 1022- W12887)	Good

Nashville EFO	MetOne	FEM (BAM 1022-W17128)	Good
Nashville EFO	MetOne	FEM (BAM 1022-T21576)	Good
Loretto	MetOne	FEM (BAM 1022-T17015)	Good
Jackson	MetOne	FEM (BAM 1022-C20236)	New
Nashville EFO	MetOne	FEM (BAM 1022-T21583(2))	Good
Clarksville	MetOne	FEM (BAM 1022-W12880)	Good
Nashville EFO	Orifice- variable	HiVol (Orifice-variable-3578)	Good
Ross N Robinson	Praxair	SO2 cylinder (JJ27921) 15.0ppm	Good
Nashville EFO	Praxair	SO2 Cylinder (JJ13225)	Good
Nashville EFO	Praxair	Mulit-Gas Cylinder (FA01131)	Good
Nashville EFO	Praxair	Mulit-Gas Cylinder (FA02370)	Good
Nashville EFO	Praxair	Multi-Gas Cylinder (CLM005225)	Good
Nashville EFO	Praxair	SO2 Cylinder JJ14752 (29.6 ppm)	Good
Nashville EFO	Praxair	SO2 cylinder (JJ13861)	Good
Happy Hill	Praxair	SO2 cylinder (JJ13627)	Good
AJ Elementary	Praxair	SO2 cylinder (JJ13668)	Good
Freels Bend	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Maryville	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Dyersburg	Sierra Wireless	Sierra Wireless AirLink RV55	Good
New Market	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Loudon	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Columbia	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Athens	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Cookeville	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Harriman	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Kingsport PM25	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Blountville	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Kingsport Ozone	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Skyland Dr.	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Cedars	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Ross N Robinson	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Hendersonville	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Fairview	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
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Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
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Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good

Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV55	Good
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Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Nashville EFO	Sierra Wireless	Sierra Wireless AirLink RV50	Good
Happy Hill	Sierra Wireless	Sierra Wireless AirLink RV55	Good
AJ Elementary	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Loretto	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Jackson	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Clarksville	Sierra Wireless	Sierra Wireless AirLink RV55	Good
Nashville EFO	SKC Inc	Aircheck 224-PCXR7-513280	Good
Nashville EFO	SKC Inc	Aircheck 224-PCXR7-513391	Good
Nashville EFO	SKC Inc	Aircheck 224-PCXR7-513768	Good
Freels Bend	Teledyne	zero air generator	Good
Freels Bend	Teledyne	T400 Ozone analyzer - 4514	Good
Freels Bend	Teledyne	T703 Ozone calibrator	Good
New Market	Teledyne	T400 Ozone analyzer - 4513	Good
New Market	Teledyne	zero air generator	Good
New Market	Teledyne	T703 Ozone calibrator 646	Good
Loudon	Teledyne	Ozone analyzers (T400-2285)	Good
Loudon	Teledyne	zero air generator	Good
Loudon	Teledyne	T703 Ozone calibrator	Good
Blountville	Teledyne	zero air generator	Good
Blountville	Teledyne	Ozone Analyzer (T400-2282)	Good
Blountville	Teledyne	T703 Ozone calibrator	Good
Kingsport Ozone	Teledyne	Ozone analyzers (T400-2283)	Good
Kingsport Ozone	Teledyne	zero air generator	Good
Kingsport Ozone	Teledyne	T703 Ozone calibrator	Good
Skyland Dr.	Teledyne	SO2 Calibrator (T700-3514)	Good
Skyland Dr.	Teledyne	zero air generator	Good
Skyland Dr.	Teledyne	SO2 Analyzer T100 Analyzer #4300	Good
Cedars	Teledyne	Ozone analyzers (T400-2284)	Good
Cedars	Teledyne	Ozone Calibrator (T703-328)	Good
Cedars	Teledyne	zero air generator	Good
Ross N Robinson	Teledyne	Zero Air Compressor (T701-557)	Good
Ross N Robinson	Teledyne	SO2 Analyzer (T100-2262)	Good

Ross N Robinson	Teledyne	SO2 Calibrator (T700-2596)	Good
Hendersonville	Teledyne	Ozone Calibrator (T703-327)	Good
Hendersonville	Teledyne	T400 Ozone analyzer - 4512	Good
Fairview	Teledyne	zero air generator	Good
Fairview	Teledyne	T400 Ozone analyzer - 4510	Good
Fairview	Teledyne	T703 Ozone calibrator	Good
Nashville EFO	Teledyne	Ozone Calibrator (703E-93)	Good
Nashville EFO	Teledyne	Ozone Calibrator (703E-185)	Good
Nashville EFO	Teledyne	T400 Ozone analyzer - 4511	Good
Nashville EFO	Teledyne	Ozone analyzers (API 400E-2269)	Good
Nashville EFO	Teledyne	SO2 Calibrator (T700-489)	Good
Nashville EFO	Teledyne	Ozone Calibrator (T703-326)	Good
Nashville EFO	Teledyne	Ozone Calibrator (T703-329)	Good
Nashville EFO	Teledyne	Ozone Calibrator (T703-330)	Good
Nashville EFO	Teledyne	Ozone Calibrator (T703-332)	Good
Nashville EFO	Teledyne	SO2 Analyzer (M100E-3629)	Good
Nashville EFO	Teledyne	Ozone Calibrator (703E-302)	Good
Nashville EFO	Teledyne	Ozone analyzers (API 400E-2872)	Good
Nashville EFO	Teledyne	Ozone analyzers (T400-2279)	Good
Nashville EFO	Teledyne	SO2 Calibrator (T700-2597)	Good
Nashville EFO	Teledyne	SO2 Calibrator (T700-1431)	Good
Nashville EFO	Teledyne	Ozone Calibrator (T703-331)	Good
Nashville EFO	Teledyne	Ozone analyzers (T400-2325)	Good
Nashville EFO	Teledyne	SO2 Analyzer (M100E-3460)	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Nashville EFO	Teledyne	Ozone Calibrator (703E-184)	Good
Nashville EFO	Teledyne	T700 SO2 Calibrator	Good
Nashville EFO	Teledyne	T700 SO2 Calibrator	Good
Nashville EFO	Teledyne	T700 SO2 Calibrator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	SO2 analyzer (T100-4301) N53477	Good
Nashville EFO	Teledyne	SO2 analyzer (T100- 4299) N53478	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Nashville EFO	Teledyne	T300u CO analyzer	Good

Nashville EFO	Teledyne	T500u NO2 analyzer	Good
Nashville EFO	Teledyne	zero air generator	Good
Nashville EFO	Teledyne	T703 Ozone calibrator	Good
Nashville EFO	Teledyne	portable zero air supply	Good
Nashville EFO	Teledyne	portable zero air supply	Good
Nashville EFO	Teledyne	portable zero air supply	Good
Nashville EFO	Teledyne	SO2 Analyzer T100-3212 N50918	Good
Nashville EFO	Teledyne	SO2 Analyzer T100 #3210	Good
Nashville EFO	Teledyne	Ozone Analyzer (T400-2278)	Good
Nashville EFO	Teledyne	T750u Multi-gas calibrator	Good
Happy Hill	Teledyne	SO2 Calibrator (T700-488)	Good
Happy Hill	Teledyne	zero air generator	Good
Happy Hill	Teledyne	SO2 Analyzer (T100 SN3211)	Good
AJ Elementary	Teledyne	SO2 Analyzer (T100-2261)	Good
AJ Elementary	Teledyne	SO2 Calibrator (T700-1432)	Good
AJ Elementary	Teledyne	zero air generator	Good
AJ Elementary	Teledyne	SO2 Calibrator (T700-3515)	Good
Nashville EFO	Thermo Scientific	Ozone analyzers (TEI 49i-722923524)	Good
Nashville EFO	Thermo Scientific	Ozone analyzers (TEI 49i -727125393)	Good
Hendersonville	Thermo Scientific	2025i PM2.5 FRM (2025IW)	Good
Nashville EFO	Thermo Scientific	PM2.5 FRM (2025-80607)	Good
Nashville EFO	Thermo Scientific	PM2.5 FRM (2025-22164)	Good
Nashville EFO	Thermo Scientific	PM2.5 FRM (2025-22165)	Good
Nashville EFO	Thermo Scientific	PM2.5 FRM (2025-21908)	Good
Nashville EFO	Thermo Scientific	PM2.5FRM (2025-21908)	Good
Nashville EFO	Thermo Scientific	PM2.5 FRM (2025IW)	Good
Nashville EFO	Thomas	Thomas Pump	Good
Nashville EFO	Unknown	Air Compressor (1 of 2) (0.5 HP)	Good
Nashville EFO	Unknown	Air Compressor (2 of 2) (0.5 HP)	Good
Nashville EFO	MetOne	FEM (BAM 1022-C17405)	New
Nashville EFO	MetOne	FEM (BAM 1022- C19053)	New
Nashville EFO	MetOne	FEM (BAM 1022-C19052)	New
Nashville EFO	MetOne	FEM (BAM 1022-C19068)	New
Nashville EFO	MetOne	FEM (BAM 1022-C19066)	New
Nashville EFO	MetOne	FEM (BAM 1022-C20215)	New
Nashville EFO	MetOne	FEM (BAM 1022-C20233)	New
Nashville EFO	MetOne	FEM (BAM 1022-C20239)	New

Appendix B Tennessee Monitoring Site Agreement Letters

Kentucky

TN Department of Environment & Conservation

February 16, 2021

Ms. Melissa Duff
Director
Kentucky Division for Air Quality
Kentucky Department for Environmental Protection
300 Sower Boulevard
2nd Floor
Frankfort, KY 40601

Dear Ms. Duff:

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D states in part "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants. Tennessee and Kentucky share the Clarksville, TN-KY MSA, which is comprised of Trigg and Christian counties in Kentucky and Montgomery and Stewart counties in Tennessee.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2019 Pop Estimate	2010 Census
17300	Clarksville, TN-KY	Metropolitan Statistical Area	307820	273949

The Tennessee Division of Air Pollution Control (TDEC DAPC) currently operates one (1) PM2.5 FEM continuous monitor at site 47-125-2001. This provides sufficient characterization of the particulate air quality in the entire Clarksville, TN-KY MSA and complies with the requirements for both population and concentration-based monitoring identified in the regulations found at 40 CFR 58, Appendix D.

The Kentucky for Air Quality currently operates one (1) seasonal ozone monitor at site 21-047-0006. This site characterizes the ozone air quality in the entire Clarksville, TN-KY MSA and complies with the requirements for both population concentration-based monitoring identified in 40 CFR Part 58, Appendix D.

TDEC DAPC would like to invite Kentucky's Division for Air Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying Kentucky in advance of any proposed relocations or monitor shutdowns in the Clarksville, TN-KY MSA and respectfully requests that Kentucky provide

Division of Air Pollution Control
William Snodgrass Tennessee Tower • 15th Floor • Nashville, TN 37243
312 Rosa L. Parks Avenue • Nashville, TN 37243
Tel: 615-532-0554 • Fax: 615-532-0614
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Department of Environment & Conservation

notification to Tennessee in advance of any proposed equipment shutdowns or relocations within the Clarksville, TN-KY MSA. Advanced notice would allow both parties to make adequate monitoring arrangements to ensure the MSA monitoring requirements are being met. If you have technical questions, contact Bradley King at 615-687-7042 or Bradley.King@tn.gov. I may be contacted at 615-532-9668 or Michelle.B.Walker@tn.gov.

Sincerely,

Michelle W. Owenby

Michelle Walker Owenby
Director
Division of Air Pollution Control
Department of Environment and Conservation

Division of Air Pollution Control
William Snodgrass Tennessee Tower • 15th Floor • Nashville, TN 37243
312 Rosa L. Parks Avenue • Nashville, TN 37243
Tel: 615-532-0554 • Fax: 615-532-0614
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Kentucky Response

ANDY BESHEAR
GOVERNOR

REBECCA W. GOODMAN
SECRETARY

ANTHONY R. HATTON
COMMISSIONER

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
TELEPHONE: 502-564-2150
TELEFAX: 502-564-4245

June 21, 2021

Ms. Michelle Walker Owenby
Director
Tennessee Division of Air Pollution Control
William Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

RE: Clarksville, TN-KY MSA Monitoring Agreement

Dear Ms. Owensby:

In a letter from your office dated February 16, 2021, the Tennessee Division of Air Pollution Control (TDAPC) agreed to operate a continuous $PM_{2.5}$ monitor in order to meet the minimum network design requirements stated in 40 CFR 58, Appendix D for the Clarksville, TN-KY metropolitan statistical area (MSA). The Kentucky Division for Air Quality (KDAQ) appreciates TDAPC's cooperation and appreciates the invitation to participate in TDAPC's annual air monitoring network review.

KDAQ currently operates one (1) continuous $PM_{2.5}$ FEM monitor and one (1) continuous ozone monitor at the Hopkinsville site (21-047-0006) in Christian County, KY. In accordance with Table D-2 of 40 CFR 58, Appendix D, one (1) ozone monitor is required to be operated in the Clarksville, TN-KY MSA, based upon currently available population estimates from the US Census Bureau, as well 2018-2020 three-year ozone design values (DV). $PM_{2.5}$ monitoring is not currently required in the MSA, based upon the minimum monitoring requirements found in 40 CFR 58, Appendix D.

Geographic Area	Code	2019 USCB Population Est.	2018-2020 3-Year O_3 DV	2018-2020 3-Year $PM_{2.5}$ DV
Christian County, KY	21-047	70,461	0.058	8.1
Trigg County, KY	21-221	14,651	0.061 (CASTNET)	-
Montgomery County, TN	47-125	208,993	-	7.3 *
Stewart County, TN	47-161	13,715	-	6.8 *
Clarksville, TN-KY MSA	**17300**	**307,820**	**0.061**	**8.1**

**Does not meet data completeness requirements*

To satisfy regulatory requirements, KDAQ agrees to continue to operate one (1) ozone monitor at the Hopkinsville site. While $PM_{2.5}$ monitoring is not currently required for the MSA, KDAQ will continue to operate the continuous $PM_{2.5}$ FEM at the Hopkinsville site, as it is currently the design value monitor for the MSA. When possible, KDAQ agrees to provide advanced notification to TDAPC in the event that shutdown or relocation of either the ozone or $PM_{2.5}$ monitor is necessary.

KDAQ commits to sharing with TDAPC all quality-assured ambient air monitoring data collected in the Kentucky portion of the Clarksville, TN-KY MSA. KDAQ also welcomes TDAPC's participation in Kentucky's annual network review process. If you have any questions or concerns, please contact Jennifer Miller at 502-782-6708.

Sincerely,

for Melissa Duff,
Director

MKD/jfm

Electronic cc:
-Bradley King, TDAPC
-Jenna Nall, KDAQ

Virginia

TN Department of Environment & Conservation

February 16, 2021

Michael Dowd
Director
Air and Renewable Energy Division
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Dowd:

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D states in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants. Tennessee and Virginia share the Kingsport-Bristol-Bristol, TN-VA MSA, which is comprised of Scott and Washington counties in Virginia and Hawkins and Sullivan counties in Tennessee.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2019 Pop Estimate	2010 Census
28700	Kingsport-Bristol-Bristol, TN-VA	Metropolitan Statistical Area	307202	309544

The Tennessee Division of Air Pollution Control (TDEC DAPC) currently operates one (1) FEM $PM_{2.5}$ continuous monitor at site 47-163-1007, two (2) seasonal ozone monitors at sites 47-163-2002 and 47-163-2003, one (1) collocated lead monitoring site (47-163-3004), and four (4) SO_2 monitoring sites; Skyland Drive (47-163-6002), Ross N Robinson (47-163-6001), Happy Hill (47-163-6004), and Andrew Johnson (47-163-6003) all in Sullivan County. These monitoring sites are sufficient to properly characterize the particular air quality in the Kingsport-Bristol-Bristol, TN-VA MSA and comply with the requirements for both population and concentration-based monitoring identified in the revised monitoring regulations found in 40 CFR Part 58, Appendix D.

The TDEC DAPC SO_2 monitoring network also satisfies the need for more "robust" monitoring to adequately characterize the Kingsport SO_2 non-attainment area in Sullivan County, Tennessee. The monitoring sites in the TDEC DAPC SO_2 monitoring network are located in close proximity to the maximum receptor areas indicated in the models included with the attainment/maintenance plan.

Division of Air Pollution Control
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312 Rosa L. Parks Avenue • Nashville, TN 37243
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Air.Pollution.Control@tn.gov

TN Department of Environment & Conservation

TDEC DAPC would like to invite Virginia's Department of Environmental Quality to participate in the Tennessee's annual ambient monitoring network review. Tennessee commits to notifying Virginia in advance of any proposed monitor shutdowns or relocations within the Kingsport-Bristol-Bristol, TN-VA MSA and respectfully requests that Virginia notify Tennessee of any monitoring network additions or changes within the Kingsport-Bristol-Bristol, TN-VA MSA. Advanced notice would allow both parties to make adequate monitoring arrangements to ensure the MSA monitoring required are being met. If you have technical questions, please contact Bradley King at 615-687-7042 or Bradley.King@tn.gov. I may be contacted at 615-532-9668 or Michelle.B.Walker@tn.gov.

Sincerely,

Michelle W. Owenby

Michelle Walker Owenby
Director
Division of Air Pollution Control
Department of Environment and Conservation

Division of Air Pollution Control
William Snodgrass Tennessee Tower • 15th Floor • Nashville, TN 37243
312 Rosa L. Parks Avenue • Nashville, TN 37243
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Virginia Response

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

June 29, 2021

Michelle Walker Owenby, Director
Division of Air Pollution Control
Wm. Snodgrass Tennessee Tower – 15th floor
Nashville, TN 37243

Dear Ms. Owenby,

In your letter dated February 16, 2021 you identified the Kingsport-Bristol-Bristol, TN-VA Metropolitan Statistical Area (MSA) as including Scott and Washington Counties within the Commonwealth of Virginia and that Tennessee maintains several air pollution monitoring devices within the Tennessee jurisdictions of that MSA. Included in this listing are identified four (4) separate Sulfur Dioxide (SO_2) monitors that are intended to characterize the Non-attainment Area for SO_2 in Sullivan County. Your letter is intended to address the requirement located in 40 CFR Part 58, Appendix D that State agencies that share MSAs are required to meet the monitoring requirements of the MSA independently in the absence of an agreement between the affected states.

Virginia maintains one (1) air monitoring location in the affected MSA; Site ID. 51-520-0006 PM2.5 FRM monitor at Highland View Elementary School in Bristol, Virginia. This site has been in operation since January, 1999. Virginia commits to notifying Tennessee in advance of any proposed shutdown of this monitor or relocation within the Kingsport-Bristol-Bristol, TN-VA MSA and any additions of any monitoring systems within the MSA. Please let me know if you have any questions or comments regarding the above commitment.

Sincerely,

Michael G. Dowd

Digitally signed by: Michael G. Dowd
DN: CN = Michael G. Dowd email = michael.dowd@deq.virginia.gov + US O = Va. Dept. of Environmental Quality OU = Director, Air and Renewable Energy Division
Date: 2021.06.29 16:01:33 -05'00'

Michael G. Dowd
Director, Division of Air and Renewable Energy

SHELBY COUNTY HEALTH DEPARTMENT

LEE HARRIS
MAYOR

MICHELLE A. TAYLOR, MD DRPH, MPA
HEALTH DIRECTOR & OFFICER

May 5, 2023

Ms. Michelle Walker Owenby, Air Director
Tennessee Department of Environment and Conservation Air Pollution Control Division
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Ave., 15th Floor
Nashville, TN 37243-1531

Ms. Melissa Fortenberry, Air Division Chief
Mississippi Department of Environmental Quality
Office of Pollution Control
Air Division
P.O. Box 2261
Jackson, MS 39201

Mr. David Witherow, P.E., Associate Director
Office of Air Quality
Arkansas Department of Energy and Environment
5301 Northshore Dr.
North Little Rock, AR 72118-5317

Dear All,

In accordance with the provisions of the Memorandum of Agreement (MOA) signed in May and June of 2008 between the Shelby County Health Department (SCHD), Mississippi Department of Environmental Quality (MDEQ) and the Arkansas Department of Energy and Environment - Division of Environmental Quality (DEQ), this letter serves as a notification that each respective agency in the MOA have been contacted by the SCHD and no changes have been made in the current monitoring network. With this MOA, all agencies are meeting EPA monitoring requirements.

If changes to the network will or will not be made in the future, please notify the respective agencies of your intent.

If you have any questions, please call me at (901) 222-9193.

Sincerely,

Kasla S. Alexander

Kasla Smith-Alexander
Bureau Director, Environmental Health Services
Shelby County Health Department

Mission
To promote, protect and improve the health of ALL in Shelby County.

814 Jefferson Avenue♦ Memphis, TN 38105♦ 901 222-9000♦ www.shelbytnhealth.com

MEMORANDUM OF AGREEMENT ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR THE MEMPHIS, TN- MS- AR METROPOLITAN STATISTICAL AREA (MSA)

Participating Agencies:

Shelby County Health Department (SCHD)
Air Pollution Control Program

Mississippi Department of Environmental Quality (MDEQ)
Office of Pollution Control, Air Division

Arkansas Department of Energy and Environment
Division of Environmental Quality (DEQ)

PURPOSE / OBJECTIVE / GOALS

The purpose of this Memorandum of Agreement (MOA) is to inform the entities of the Memphis, Tennessee-Mississippi-Arkansas Metropolitan Statistical Area of monitoring network changes. The MOA between SCHD, MDEQ, and DEQ is to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less ($PM_{2.5}$), and ozone; as well as other criteria pollutants air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will formalize and reaffirm the collective agreement in order to provide adequate criteria pollutant monitoring for the Memphis, TN-MS-AR MSA as required by 40 CFR 58 Appendix D, Section 2, (e).

$PM_{2.5}$ MSA monitoring network include:

County	Federal Referenced Method $PM_{2.5}$	Federal Equivalent Method $PM_{2.5}$	Continuous $PM_{2.5}$	Speciation $PM_{2.5}$	Collocated $PM_{2.5}$
Shelby County, TN **SCHD**	4 (includes 2 at Alabama, 1 at NCore, and 1 at the Near Road station)	1		1	2
Crittenden County, AR **DEQ**	1		1		
DeSoto County, MS **MDEQ**		1			

Criteria Air Pollutant MSA monitoring network include:

County	PM_{10}	$PM_{10-2.5}$	O_3	$NO_y/NO_y/NO/NO_2$	CO	SO_2
Shelby County, TN **SCHD**	2 (TEOM at Alabama Ave. and T640x at NCore)	1	3	3 (includes 1 NO_y/NO_2 at the Near Road Station, 1 NO/NO_y at NCore/PAMS, 1 true NO_2 at NCore/PAMS)	2 (includes 1 trace at NCore and 1 at the Near Road Station)	1 (trace at NCore)
Crittenden County, AR **DEQ**			1	1		
DeSoto County, MS **MDEQ**			1			

RESPONSIBILITIES / ACTIONS

Each of the parties to this Agreement is responsible for ensuring that its obligations under the MOA are met. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected agency shall inform the other affected agencies via telephone or email of any monitoring changes occurring within its jurisdiction of the MSA at its earliest convenience, after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disasters, or any occurrences that result in an extended (greater than one quarter) or permanent change in the monitoring network.

LIMITATIONS

- All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates SCHD, MDEQ, or DEQ to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.

- This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate agreements that will be affected in writing by representatives of the parties.

- This MOA does not create any right or benefit enforceable by law or equity against SCHD, MDEQ, or DEQ, their officers or employees, or any other person. This MOA does not apply to any entity outside SCHD, MDEQ, or DEQ.

- No proprietary information or intellectual property is anticipated to arise out of this MOA.

TERMINATION

This Memorandum of Agreement may be revised upon the mutual consent of SCHD, MDEQ and DEQ. Each party reserves the right to terminate this MOA. A thirty (30) day written notice must be given prior to the date of termination.

Mississippi Response

STATE OF MISSISSIPPI
TATE REEVES
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
CHRIS WELLS, EXECUTIVE DIRECTOR

May 17, 2023

Mr. Goldstein,

I have reviewed the Memorandum of Agreement between Crittenden County Arkansas and Shelby County Tennessee. The Mississippi Department of Environmental Quality (MDEQ) has not made any changes or have plans to change our monitoring efforts at the Desoto County Mississippi monitoring site. MDEQ will continue to operate the continuous $PM_{2.5}$ (API T640) and ozone instruments for 2024.

Thanks,
Michael Jordan

Michael Jordan
Air Monitoring Section, Chief
Mississippi Department of Environmental Quality
515 East Amite Street
Jackson, Ms 39201
p. 601-961-5790
c. 601-573-6574

OFFICE OF POLLUTION CONTROL
Post Office Box 2261·Jackson, Mississippi 39225-2261·Tel: (601) 961-5171·Fax: (601) 354-6612·www.mdeq.ms.gov
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Arkansas Response

ARKANSAS
ENERGY & ENVIRONMENT

May 31, 2023

Ms. Michelle Walker Owenby, Air Director
Tennessee Department of Environment and Conservation
Air Pollution Control Division
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Ave., 15th Floor
Nashville, TN 37243-1531

Ms. Melissa Fortenberry, Air Division Chief
Mississippi Department of Environmental Quality
Office of Pollution Control, Air Division
P.O. Box 2261
Jackson, MS 39201

Karen Cook-Pryor, Deputy Administrator
Pollution Control Section
Shelby County Health Department
1826 Sycamore View Road
Memphis, TN 38134

Dear All,

In accordance with the provisions of the Memorandum of Agreement signed in May and June of 2008 between the Shelby County Health Department (SCHD), Mississippi Department of Environmental Quality (MDEQ), and the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ), this letter serves as a notification that no changes have been made in our current network and DEQ is currently meeting all EPA monitoring requirements.

Sincerely,

David Witherow, PE
Associate Director, Office of Air Quality
Division of Environmental Quality
Arkansas Department of Energy and Environment

ARKANSAS DEPARTMENT OF ENERGY AND ENVIRONMENT

Appendix C Sections of the CFR Referred to in the 2021/22 AMNP

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)

(1) Beginning July 1, 2007, the state, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and ARM monitors that are part of SLAMS, NCore, CSN, PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E of this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.

(2) Any annual monitoring network plan that proposes network modifications (including new or discontinued monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS, and changes in identification of monitors as suitable or not suitable for comparison against the annual PM2.5 NAAQS) to SLAMS networks is subject to the approval of the EPA Regional Administrator, who shall approve or disapprove the plan within 120 days of submission of a complete plan to the EPA.

(3) The plan for establishing required NCore multipollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(4) A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than July 1, 2011. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy to be operational by December 27, 2011.

(5)

(i) A plan for establishing or identifying an area-wide NO2 monitor, in accordance with the requirements of Appendix D, section 4.3.3 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(ii) A plan for establishing or identifying any NO2 monitor intended to characterize vulnerable and susceptible populations, as required in Appendix D, section 4.3.4 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(iii) A plan for establishing a single near-road NO2 monitor in CBSAs having 1,000,000 or more persons, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2013. The plan shall provide for these required monitors to be operational by January 1, 2014.

(iv) A plan for establishing a second near-road NO2 monitor in any CBSA with a population of 2,500,000 persons or more, or a second monitor in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts, in accordance with the requirements of appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitors to be operational by January 1, 2015.

(6) A plan for establishing SO2 monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator by July 1, 2011 as part of the annual network plan required in paragraph (a) (1). The plan shall provide for all required SO2 monitoring sites to be operational by January 1, 2013.

(7) A plan for establishing CO monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator. Plans for required CO monitors shall be submitted at least six months prior to the date such monitors must be established as required by section 58.13.

(8)

(i) A plan for establishing near-road PM2.5 monitoring sites in CBSAs having 2.5 million or more persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitoring stations to be operational by January 1, 2015.

(ii) A plan for establishing near-road PM2.5 monitoring sites in CBSAs having 1 million or more persons, but less than 2.5 million persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these required monitoring stations to be operational by January 1, 2017.

(9) The annual monitoring network plan shall provide for the required O3 sites to be operating on the first day of the applicable required O3 monitoring season in effect on January 1, 2017 as listed in Table D-3 of appendix D of this part.

(10) A plan for making Photochemical Assessment Monitoring Stations (PAMS) measurements, if applicable, in accordance with the requirements of appendix D paragraph 5(a) of this part shall be submitted to the EPA Regional Administrator no later than July 1, 2018. The plan shall provide for the required PAMS measurements to begin by June 1, 2019.

(11) An Enhanced Monitoring Plan for O3, if applicable, in accordance with the requirements of appendix D paragraph 5(h) of this part shall be submitted to the EPA Regional Administrator no later than October 1, 2019 or two years following the effective date of a designation to a classification of Moderate or above O3 nonattainment, whichever is later.

(12) A detailed description of the PAMS network being operated in accordance with the requirements of appendix D to this part shall be submitted as part of the annual monitoring network plan for review by the EPA Administrator. The PAMS Network Description described in section 5 of appendix D may be used to meet this requirement.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM2.5 NAAQS as described in § 58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.

(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM10 monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

(12) The identification of required NO2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.

(13) The identification of any PM2.5 FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the PM2.5 Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in § 58.12 or other Class III PM2.5 FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

(c) The annual monitoring network plan must document how state and local agencies provide for the review of changes to a PM2.5 monitoring network that impact the location of a violating PM2.5 monitor. The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The state, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every five years beginning July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to § 58.14.

[71 FR 61298, Oct. 17, 2006, as amended at 72 FR 32210, June 12, 2007; 73 FR 67059, Nov. 12, 2008; 73 FR 77517, Dec. 19, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3282, Jan. 15, 2013; 80 FR 65466, Oct. 26, 2015; 81 FR 17279, Mar. 28, 2016; 81 FR 96388, Dec. 30, 2016]

Appendix D Monitoring Network Requirements

Ozone Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 current as of April 3, 2020

4.1 Ozone (O3) Design Criteria. (a) State, and where appropriate, local agencies must operate O3 sites for various locations depending upon area size (in terms of population and geographic characteristics) and typical peak concentrations (expressed in percentages below, or near the O3 NAAQS). Specific SLAMS O3 site minimum requirements are included in Table D-2 of this appendix. The NCore sites are expected to complement the O3 data collection that takes place at single-pollutant SLAMS sites, and both types of sites can be used to meet the network minimum requirements. The total number of O3 sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding O_3-related atmospheric processes will include more sites than these minimum numbers required in Table D-2 of this appendix. The EPA Regional Administrator and the responsible State or local air monitoring agency must work together to design and/or maintain the most appropriate O3 network to service the variety of data needs in an area.

TABLE D–2 OF APPENDIX D TO PART 58 SLAMS MINIMUM O_3 MONITORING REQUIREMENTS

MSA population[1, 2]	**Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]**	**Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]**
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 [5]	1	0

1. Minimum monitoring requirements apply to the metropolitan statistical area (MSA).
2. Population based on latest available census figures.
3. The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
4. These minimum monitoring requirements apply in the absence of a design value.
5. Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Within an O3 network, at least one O3 site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular metropolitan area. More than one maximum concentration site may be necessary in some areas. Table D-2 of this appendix does not account for the full breadth of additional factors that would be considered in designing a complete O3 monitoring program for an area. Some of these additional factors include geographic size, population density, complexity of terrain and meteorology, adjacent O3 monitoring programs, air pollution transport from neighboring areas, and measured air quality in comparison to all forms of the O3 NAAQS (i.e., 8-hour and 1-hour forms). Networks must be designed to account for all of these area characteristics. Network designs must be re-examined in periodic network assessments. Deviations from the above O3 requirements are allowed if approved by the EPA Regional Administrator.

CO Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.2.1 General Requirements. (a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near-road NO2 monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO2 monitor, only one CO monitor is required to be collocated with a near-road NO2 monitor within that CBSA.

(b) If a state provides quantitative evidence demonstrating that peak ambient CO concentrations would occur in a near-road location which meets microscale siting criteria in Appendix E of this part but is not a near-road NO2 monitoring site, then the EPA Regional Administrator may approve a request by a state to use such an alternate near-road location for a CO monitor in place of collocating a monitor at near-road NO2 monitoring site.

NO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.3.2 Requirement for Near-road NO_2 Monitors

(a) Within the NO2 network, there must be one microscale near-road NO2 monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near-road NO2 monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.

(1) The near-road NO2 monitoring sites shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO2 concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part. Where a state or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO2 concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO2 monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation.

(b) Measurements at required near-road NO2 monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO2, and NOX.

SO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.4 Sulfur Dioxide (SO_2) Design Criteria.

4.4.1 General Requirements. (a) State and, where appropriate, local agencies must operate a minimum number of required SO2 monitoring sites as described below.

4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO2 monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO2 in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO2 monitor is required within that CBSA.

(1) The SO2 monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part. Any monitor that is sited outside of a CBSA with minimum monitoring requirements to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

Table 5: TDEC DAPC Interpretation of the PWEI SO_2 Monitoring Requirements

CBSA AREA NAME	POP ESTIMATE 2022	2020 SO_2 NEI Tons	PWEI 2021	PWEI 2022	SO_2 Monitors Required	Change from 2021
Chattanooga, TN-Ga	574,507	146	80	84	0	-
Clarksville, TN-KY	336,605	7,842	252	2,640	0	-
Cleveland, TN	128,479	61	7	8	0	-
Jackson, TN	181,579	180	35	33	0	-
Johnson City, TN	210,256	30	10	6	0	-
Kingsport-Bristol-Bristol, TN-VA	311,272	4,633	4052	1,442	0	-
Knoxville, TN	907,968	1,634	2925	1,484	0	-
Memphis, TN-MS-AR	1,332,305	785	11,967	1,046	0	-1
Morristown, TN	146,172	41	4	6	0	-
Nashville-Davidson-Murfreesboro-Franklin, TN	2,046,828	1,814	8,280	3,713	0	-1

*NEI data not including mobile sources of SO2

4.4.3 *Regional Administrator Required Monitoring.* (a) The Regional Administrator may require additional SO_2 monitoring stations above the minimum number of monitors required in 4.4.2 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where an area has the potential to have concentrations that may violate or contribute to the violation of the NAAQS, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations, which are not monitored under the minimum monitoring provisions described above. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and/or maintain the most appropriate SO_2 network to provide sufficient data to meet monitoring objectives.

4.4.5 *NCore Monitoring.* (a) SO_2 measurements are included within the NCore multipollutant site requirements as described in paragraph (3)(b) of this appendix. NCore-based SO_2 measurements are primarily used to characterize SO_2 trends and assist in understanding SO_2 transport across representative areas in urban or rural locations and are also used for comparison with the SO_2 NAAQS. SO_2 monitors at NCore sites that exist in CBSAs with minimum monitoring requirements per section 4.4.2 above shall be allowed to count towards those minimum monitoring requirements.

Lead Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.5 *Lead (Pb) Design Criteria.* (a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb

concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (*http://www.epa.gov/ttn/chief/eiinformation.html*) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

(i) One monitor may be used to meet the requirement in paragraph 4.5(a) for all sources involved when the location of the maximum Pb concentration due to one Pb source is expected to also be impacted by Pb emissions from a nearby source (or multiple sources). This monitor must be sited, taking into account logistics and the potential for population exposure, where the Pb concentration from all sources combined is expected to be at its maximum.

(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).

(iii) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D-3A for a period of 12 consecutive months commencing no later than December 27, 2011. Monitors shall be sited to measure the maximum Pb concentration in ambient air, taking into account logistics and the potential for population exposure, and shall use an approved Pb-TSP Federal Reference Method or Federal Equivalent Method. Any monitor that exceeds 50 percent of the Pb NAAQS on a rolling 3-month average (as determined according to 40 CFR part 50, Appendix R) shall become a required monitor under paragraph 4.5(c) of this Appendix, and shall continue to monitor for Pb unless a waiver is granted allowing it to stop operating as allowed by the provisions in paragraph 4.5(a)(ii) of this appendix. Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.

$PM_{2.5}$ Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.7.1 General Requirements. (a) State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix. The NCore sites are expected to complement the $PM_{2.5}$ data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum $PM_{2.5}$ network requirements. Deviations from these $PM_{2.5}$ monitoring requirements must be approved by the EPA Regional Administrator.

Table D-5 of Appendix D to Part 58—$PM_{2.5}$ Minimum Monitoring Requirements

MSA population[1, 2]	Most recent 3-year design value ≥85% of any $PM_{2.5}$ NAAQS[3]	Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS[3, 4]
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the metropolitan statistical area (MSA).

[2]Population based on latest available census figures.

[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

[4]These minimum monitoring requirements apply in the absence of a design value.

[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Specific Design Criteria for $PM_{2.5}$. The required monitoring stations or sites must be sited to represent area-wide air quality. These sites can include sites collocated at PAMS. These monitoring stations will typically be at neighborhood or urban-scale; however, micro-or middle-scale $PM_{2.5}$ monitoring sites that represent many such locations throughout a metropolitan area are considered to represent area-wide air quality.

(1) At least one monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration.

(2) For CBSAs with a population of 1,000,000 or more persons, at least one $PM_{2.5}$ monitor is to be collocated at a near-road NO_2 station required in section 4.3.2(a) of this appendix.

(3) For areas with additional required SLAMS, a monitoring station is to be sited in an area of poor air quality.

(4) Additional technical guidance for siting $PM_{2.5}$ monitors are provided in references 6 and 7 of this appendix.

(c) The most important spatial scale to effectively characterize the emissions of particulate matter from both mobile and stationary sources is the neighborhood scale for $PM_{2.5}$. For purposes of establishing monitoring sites to represent large homogenous areas other than the above scales of representativeness and to characterize regional transport, urban or regional scale sites would also be needed. Most $PM_{2.5}$ monitoring in urban areas should be representative of a neighborhood scale.

(1) *Micro-scale.* This scale would typify areas such as downtown street canyons and traffic corridors where the general public would be exposed to maximum concentrations from mobile sources. In some circumstances, the micro-scale is appropriate for particulate sites. SLAMS sites measured at the micro-scale level should, however, be limited to urban sites that are representative of long-term human exposure and of many such microenvironments in the area. In general, micro-scale particulate matter sites should be located near inhabited buildings or locations where the general public can be expected to be exposed to the concentration measured. Emissions from stationary sources such as primary and secondary smelters, power plants, and other large industrial processes may, under certain plume conditions, likewise result in high ground level concentrations at the micro-scale. In the latter case, the micro-scale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at micro-scale sites provide information for evaluating and developing hot spot control measures.

(2) *Middle scale*—People moving through downtown areas, or living near major roadways, encounter particle concentrations that would be adequately characterized by this spatial scale. Thus, measurements of this type would be appropriate for the evaluation of possible short-term exposure public health effects of particulate matter pollution. In many situations, monitoring sites that are representative of microscale or middle-scale impacts are not unique and are representative of many similar situations. This can occur along traffic corridors or other locations in a residential district. In this case, one location is representative of a number of small-scale sites and is appropriate for evaluation of long-term or chronic effects. This scale also includes the characteristic concentrations for other areas with dimensions of a few hundred meters such as the parking lot and feeder streets associated with shopping centers, stadia, and office buildings.

(3) *Neighborhood scale*—Measurements in this category would represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the $PM_{2.5}$ exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent the immediate neighborhood as well as neighborhoods of the same type in other parts of the city. $PM_{2.5}$ sites of this kind provide good information about trends and compliance with standards because they often represent conditions in areas

where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most $PM_{2.5}$ monitoring in urban areas should have this scale.

(4) *Urban scale*—This class of measurement would be used to characterize the particulate matter concentration over an entire metropolitan or rural area ranging in size from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large-scale air pollution control strategies. Community-oriented $PM_{2.5}$ sites may have this scale.

(5) *Regional scale*—These measurements would characterize conditions over areas with dimensions of as much as hundreds of kilometers. As noted earlier, using representative conditions for an area implies some degree of homogeneity in that area. For this reason, regional scale measurements would be most applicable to sparsely populated areas. Data characteristics of this scale would provide information about larger scale processes of particulate matter emissions, losses and transport. $PM_{2.5}$ transport contributes to elevated particulate concentrations and may affect multiple urban and State entities with large populations such as in the eastern United States. Development of effective pollution control strategies requires an understanding at regional geographical scales of the emission sources and atmospheric processes that are responsible for elevated $PM_{2.5}$ levels and may also be associated with elevated O_3 and regional haze.

4.7.2 Requirement for Continuous $PM_{2.5}$ Monitoring. The State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.

4.7.3 Requirement for $PM_{2.5}$ Background and Transport Sites. Each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport. These monitoring sites may be at community-oriented sites and this requirement may be satisfied by a corresponding monitor in an area having similar air quality in another State. State and local air monitoring agencies must use methodologies and QA/QC procedures approved by the EPA Regional Administrator for these sites. Methods used at these sites may include non-federal reference method samplers such as IMPROVE or continuous $PM_{2.5}$ monitors.

4.7.4 $PM_{2.5}$ Chemical Speciation Site Requirements. Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). The selection and modification of these STN sites must be approved by the Administrator. The $PM_{2.5}$ chemical speciation urban trends sites shall include analysis for elements, selected anions and cations, and carbon. Samples must be collected using the monitoring methods and the sampling schedules approved by the Administrator. Chemical speciation is encouraged at additional sites where the chemically resolved data would be useful in developing State implementation plans and supporting atmospheric or health effects related studies.

PM_{10} Monitoring Network Requirements

4.6 Particulate Matter (PM_{10}) Design Criteria.>(a) Table D-4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM_{10} air quality trends and geographical patterns. The number of PM_{10} stations in areas where MSA populations exceed 1,000,000 must be in the range from 2 to 10 stations, while in low population urban areas, no more than two stations are required. A range of monitoring stations is specified in Table D-4 because sources of pollutants and local control efforts can vary from one part of the country to another and therefore, some flexibility is allowed in selecting the actual number of stations in any one locale. Modifications from these PM_{10} monitoring requirements must be approved by the Regional Administrator.

TABLE D-4 OF APPENDIX D TO PART 58 - PM 10 MINIMUM MONITORING REQUIREMENTS (APPROXIMATE NUMBER OF STATIONS PER MSA) 1

Population category	High concentration [2]	Medium concentration [3]	Low concentration [4, 5]
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

[1] Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.

[2] High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM 10 NAAQS by 20 percent or more.

[3] Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM 10 NAAQS.

[4] Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM 10 NAAQS.

[5] These minimum monitoring requirements apply in the absence of a design value.

Index reporting requirements

40 CFR 58 Subpart G, 58.50 Revised as of October 26, 2015.

58.50 Index reporting.

(a) The state or where applicable, local agency shall report to the general public on a daily basis through prominent notice an air quality index that complies with the requirements of Appendix G: Annual Site Evaluations to this part.

(b) Reporting is required for all individual MSA with a population exceeding 350,000.

(c) The population of a MSA for purposes of index reporting is the most recent decennial U.S. census population.

NCore Monitoring Network Requirements and PM $_{10-2.5}$

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of December 30, 2016

(a) Each State (i.e. the fifty States, District of Columbia, Puerto Rico, and the Virgin Islands) is required to operate at least one NCore site. States may delegate this requirement to a local agency. States with many MSAs often also have multiple air sheds with unique characteristics and, often, elevated air pollution. These States include, at a minimum, California, Florida, Illinois, Michigan, New York, North Carolina, Ohio, Pennsylvania, and Texas. These

States are required to identify one to two additional NCore sites in order to account for their unique situations. These additional sites shall be located to avoid proximity to large emission sources. Any State or local agency can propose additional candidate NCore sites or modifications to these requirements for approval by the Administrator. The NCore locations should be leveraged with other multipollutant air monitoring sites including PAMS sites, National Air Toxics Trends Stations (NATTS) sites, CASTNET sites, and STN sites. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

(b) The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, O_3, SO_2, CO, NO/NO_y, wind speed, wind direction, relative humidity, and ambient temperature.

(1) Although the measurement of reactive nitrogen compounds (NO_y) is required in support of several monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of nitrogen oxides (NO_x), particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NO_y and NO_x measured concentrations, the Administrator may allow for waivers that permit NO_X monitoring to be substituted for the required NO_y monitoring at applicable NCore sites.

(2) The EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

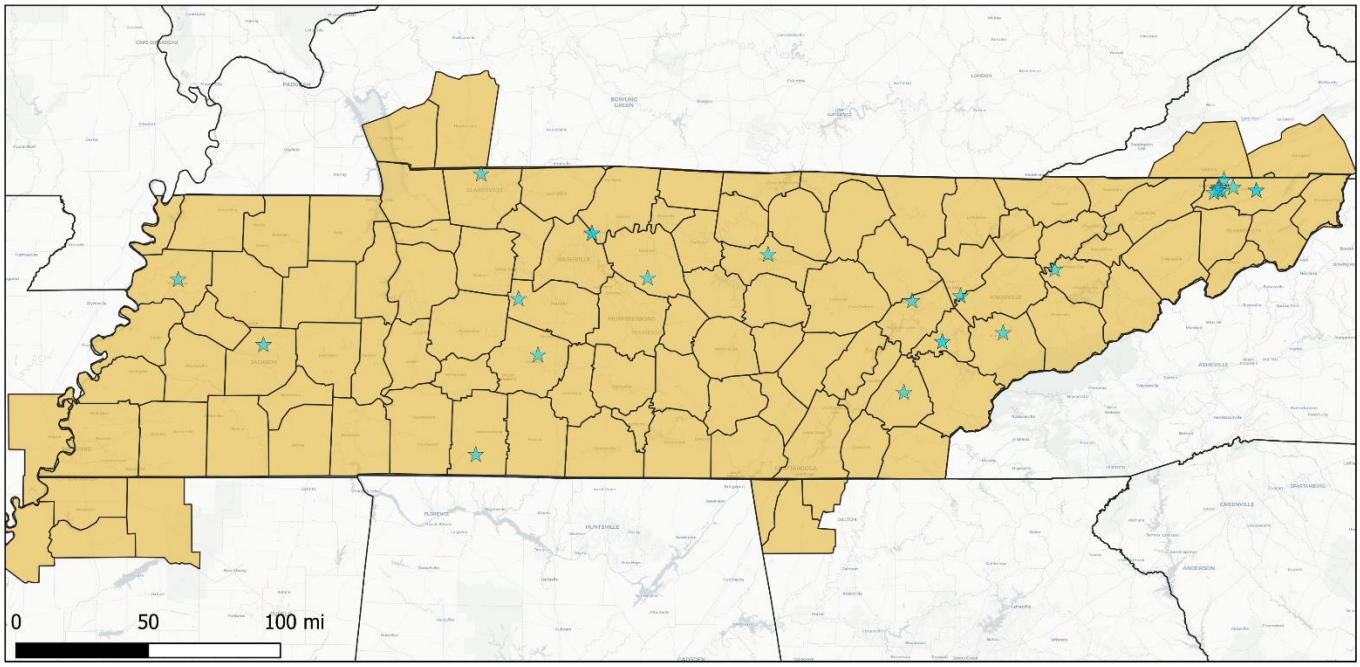
40 CFR 58 Subpart G, Appendix D to Part 58 revised as of December 30, 2016

Coarse Particulate Matter ($PM_{10-2.5}$) Design Criteria.

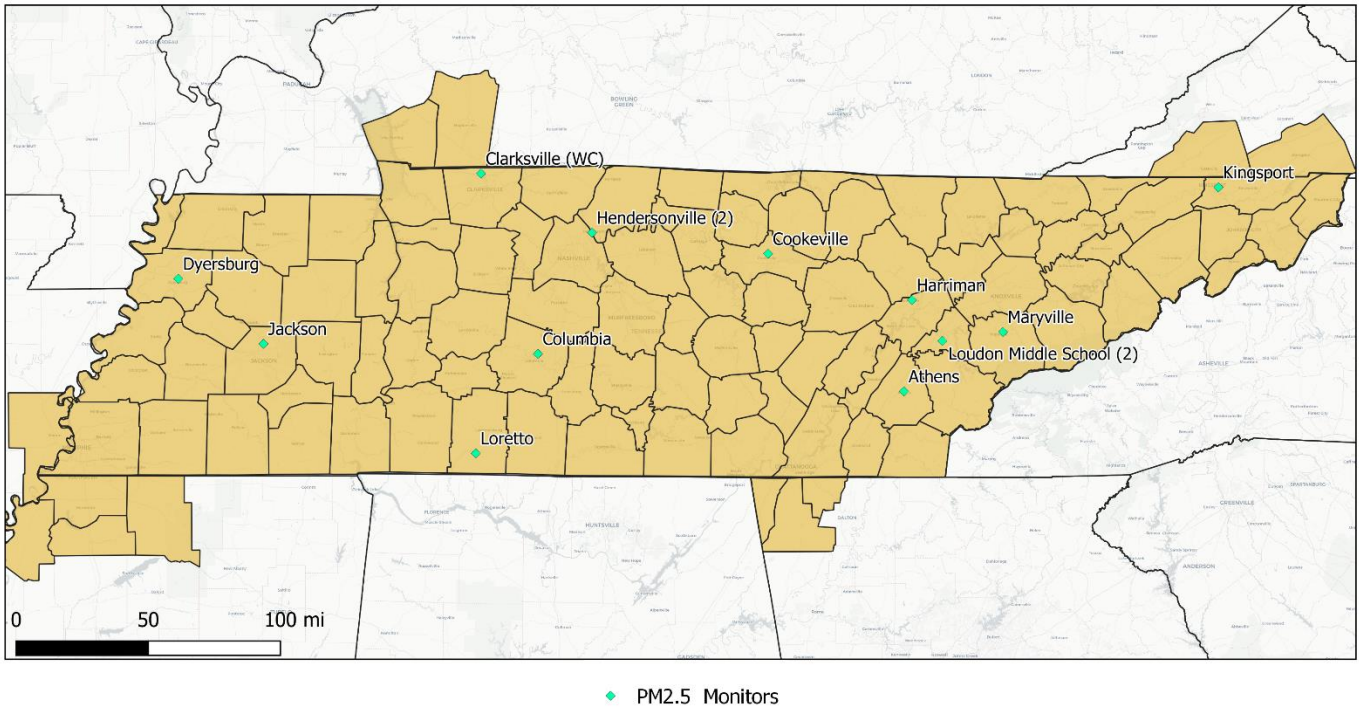
4.8.1 General Monitoring Requirements. (a) The only required monitors for $PM_{10-2.5}$ are those required at NCore Stations.
(b) Although microscale monitoring may be appropriate in some circumstances, middle and neighborhood scale measurements are the most important station classifications for $PM_{10-2.5}$ to assess the variation in coarse particle concentrations that would be expected across populated areas that are in proximity to large emissions sources.

Appendix E TDEC DAPC Monitor Maps

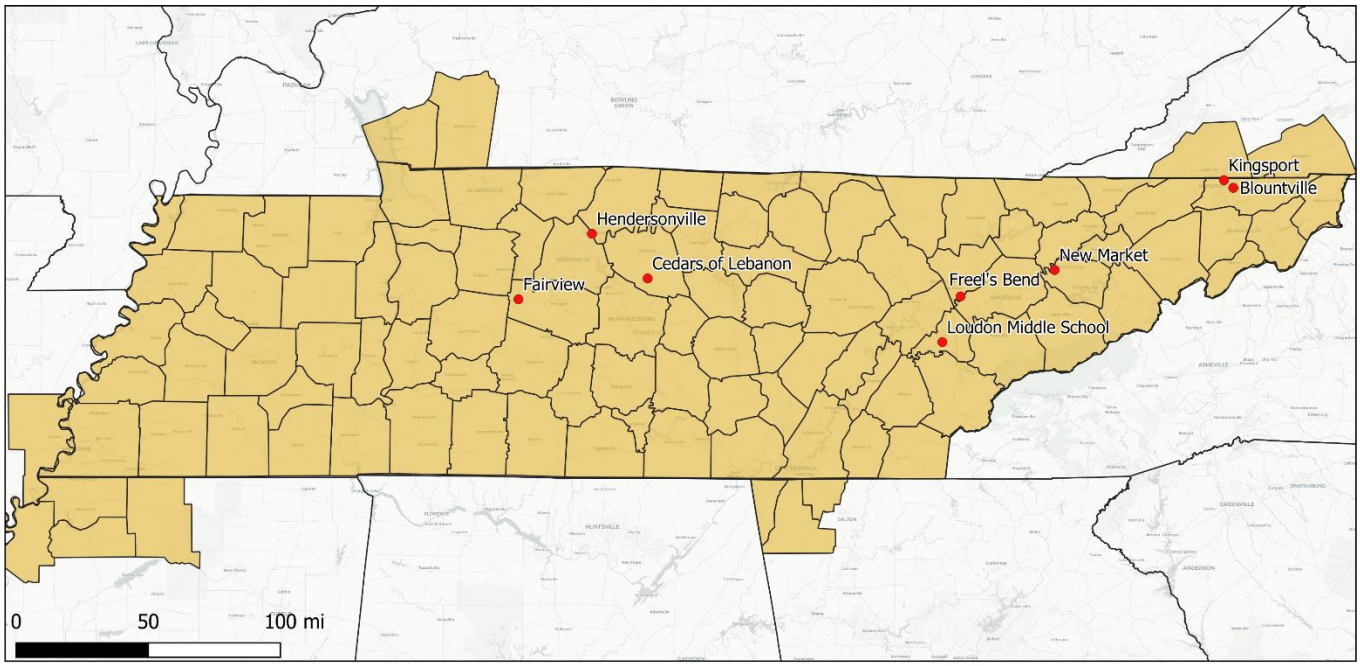
All Monitoring Sites Operated by TDEC DAPC and the National Park Service



$PM_{2.5}$ Monitor Locations

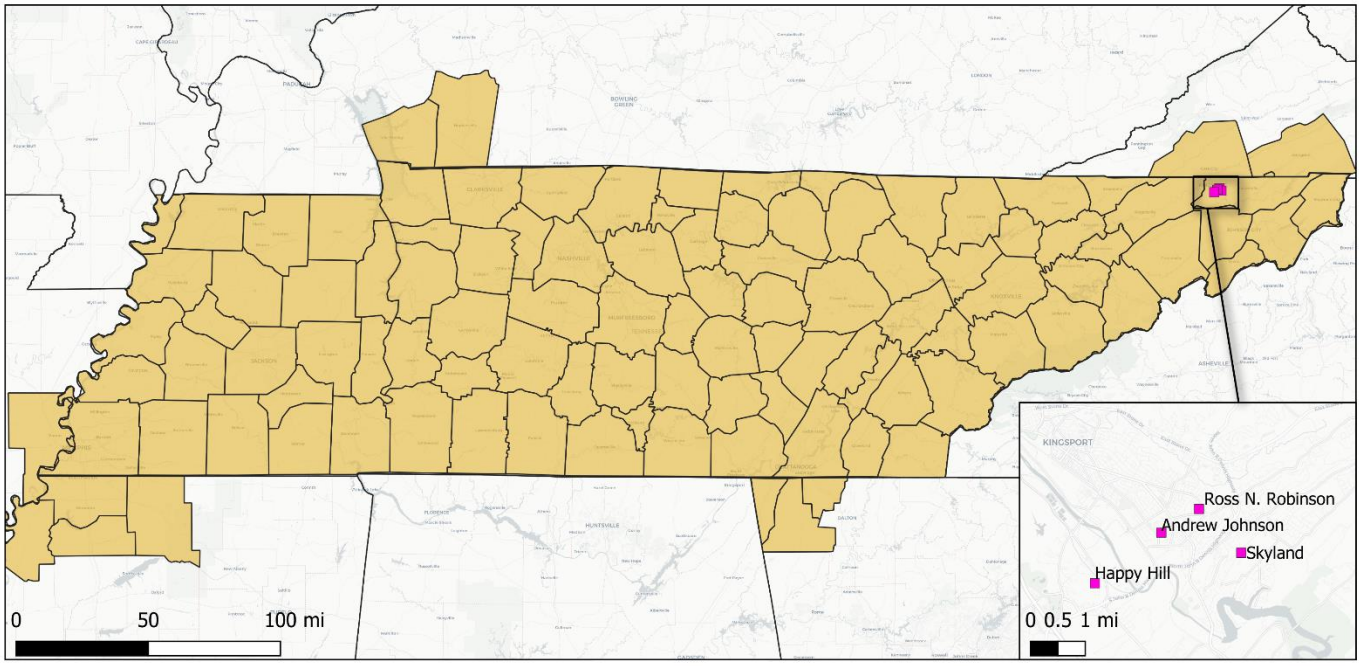


Ozone Monitor Locations



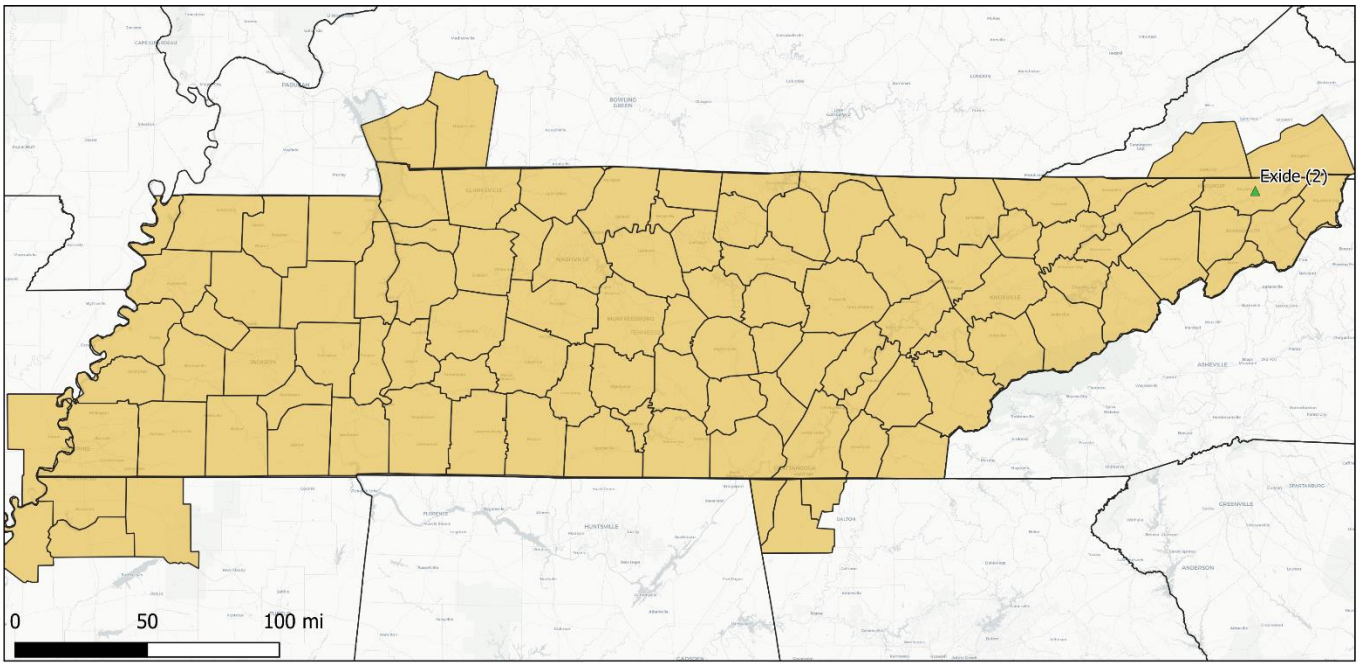
Ozone Monitors

SO_2 Monitor Locations



SO2 Monitors

Lead Monitor Locations



Appendix F Annual Site Evaluations & Documentation

2023 Tennessee monitoring site evaluation documentation can be found at TDEC DAPC's Air Quality Monitoring & Forecasting website:

https://www.tn.gov/environment/program-areas/apc-air-pollution-control-home/apc/air-quality-forecasting.html

Appendix G Draft: Tennessee 2022 Annual Ongoing Data Requirements Report

And

Exemption Modeling Demonstration from Annual Reporting of Emissions for

TVA-Allen and TVA-Johnsonville

Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard

May 8, 2023

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1.0 PURPOSE AND BACKGROUND

The Tennessee Department of Environment and Conservation Division of Air Pollution Control (TDEC APC) has prepared this report as the state's Annual Ongoing Data Requirements Report for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS) as an appendix to its Annual Monitoring Network Plan. This report is intended to fulfill the annual reporting requirements of 40 CFR Part 51 Subpart BB, "*Data Requirements Rule for Characterizing Air Quality for the Primary SO_2 NAAQS*". The Annual Ongoing Data Requirements Report is due to the EPA on July 1, 2020, to meet the reporting requirements in 40 CFR 51.1205 (b)[1]

> "(b) *Modeled areas*. For any area where modeling of actual SO_2 emissions serve as the basis for designating such area as attainment for the 2010 SO_2 NAAQS, the air agency shall submit an annual report to the Environmental Protection Agency (EPA) Regional Administrator by July 1 of each year, either as a stand-alone document made available for public inspection, or as an appendix to its Annual Monitoring Network Plan (also due on July 1 each year under 40 CFR 58.10), that documents the annual SO_2 emissions of each applicable source in each such area and provides an assessment of the cause of any emissions increase from the previous year. The first report for each such area is due by July 1 of the calendar year after the effective date of the area's initial designation."

In Tennessee, the following counties shown in Table 1 are the areas subject to the Annual Ongoing Data Requirements Report. The listed Tennessee Valley Authority (TVA) facilities are the sources that required 2012-2014 modeling within these areas.

Table 1: TN DRR Areas and 2012-2014 Modeled Sources

County	Facility[2]	Maximum 1-hour SO_2 Impact[3]		Impact Distance
		µg/m3	ppb	km
Stewart	TVA - Cumberland Fossil Plant	121.8	46.5	3.19 (SW)
Humphreys	TVA - Johnsonville Fossil Plant	127.6	48.7	2.08 (E)
Shelby	TVA -Allen Fossil Plant	172.9	66.0	1.44 (N)

[1] 80 FR 51052, DRR for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary NAAQS, August 21, 2015.

[2] The modeling packages for these facilities were originally submitted to EPA Region 4 on the following dates and were submitted again on November 10, 2016, to EPA Region 4:

TVA - Cumberland Fossil (CUF) Plant: September 21, 2016.

TVA - Johnsonville Fossil (JOF) Plant: October 12, 2016.

TVA - Allen Fossil (ALF) Plant: November 2, 2016.

[3] Maximum impacts are based on actual emissions for the affected units and permitted allowable emissions for the nearby sources, if any included.

2.0 TECHNICAL ANALYSIS

On January 13, 2017[4], TDEC APC submitted a letter to Environmental Protection Agency (EPA) requesting that Humphreys, Shelby and Stewart Counties, Tennessee be designated as attainment/unclassifiable for the 2010 SO_2 NAAQS based on TDEC APC's analysis, performed in accordance with EPA's technical assessment guidance, regarding the air quality surrounding the TVA plants and the rest of these counties. The air quality analyses were based on modeling of actual SO_2 emissions (2012-2014) from sources in and around these counties. On January 9, 2018, U.S. EPA designated these three counties as attainment/unclassifiable[5] for the 2010 SO_2 NAAQS. Therefore, these areas are subject to the ongoing verification requirements under 40 CFR 51.1205(b), and the TDEC APC is submitting this Annual Ongoing Data Requirements Report to meet the reporting requirements for these modeled areas.

Per 40 CFR 51.1205 (b), TDEC APC is required to document the annual SO_2 emissions of each applicable source in the *modeled areas*. Table 2 lists the TVA Power Stations within these *modeled areas* and details their annual actual SO_2 emissions in tons from 2012 to 2021. The air program acquired all the emission data from the Tennessee Emissions Inventory Program and confirmed the emission data matched the one in EPA's Clean Air Market Division (CAMD) Acid Rain Program (ARP) database.

Table 2. Actual SO_2 Emissions in Stewart, Humphreys, and Shelby Counties for TVA DRR Sources

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions from TnEIP (tons/year)									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Stewart County	TVA - Cumberland Fossil Plant										
	(81-0011)	10,101	7,962	9,396	8,849	10,123	6,650	7,408	7,209	7,178	7,766
Humphreys County	TVA - Johnsonville Fossil Plant										
	(43-0011)	17,812	12,072	17,518	29,631	9,202	6,330	22	13	17	62
Shelby	TVA – Allen										
County	Fossil Plant	9,609	9,989	9,750	6,950	7,693	7,635	916	14	7	58
	(79-0528)										

[4] This letter addresses revisions to the May 26, 2011, letter in revising Tennessee's sulfur dioxide designation recommendations for sources subject to the Data Requirements Rule for the 2010 SO_2 NAAQS.

[5] Federal /Register Notice Published January 9, 2018 [83 FR 1098, pages 1158-1159].

The actual modeled emissions for the DRR 2012-2014 modeling are shown in Table 3 for TVA Power Stations.

Table 3. Modeled 2012-2014 SO2 Emissions in Stewart, Humphreys, and Shelby Counties for TVA Sources

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions (tons/year)			Max-Modeled Design Value (ppb) value (ppb)
		2012	2013	2014	2012-2014
Stewart County	TVA - Cumberland Fossil Plant (81-0011)	10,103	7,964	9,396	46.5
Humphreys County	TVA - Johnsonville Fossil Plant (43-0011)	11,599	9,672	17,519	48.7
Shelby County	TVA – Allen Fossil Plant (79-0528)	9,651	10,026	9,781	66

NOTE:

[a] SO2 Hourly NAAQS = 75 ppb.

[b] TVA Cumberland two boilers were modeled only, and no other nearby sources included.

[c] TVA Johnsonville modeled with (DuPont and Hood Containers nearby sources at allowable emission rates of 59.7 and 50.8 tpy respectively).

[d] TVA Allen was modeled with the nearby (Nucor Steel Memphis source at allowable emission rate of 201.5 tpy).

The total reduction in SO2 emissions for TVA DRR sources between the modeled 2012-2014 period and the latest 2019-2021 period are shown in table 4 for Stewart, Humphreys, and Shelby Counties

Table 4. Total SO2 Emissions Reductions in Stewart, Humphreys, and Shelby Counties for TVA DRR Sources

Area	Modeled Source (Facility ID)	TVA Actual SO2 Emissions (tons/year)		Emissions Reductions (tons/year)
		2012-2014 Total (From Table 3)	2019-2021 Total (From Table 2)	
Stewart County	TVA - Cumberland Fossil Plant (81-0011)	27463	22153	-5310
Humphreys County	TVA - Johnsonville Fossil Plant (43-0011)	38790	92	-38698
Shelby County	TVA – Allen Fossil Plant (79-0528)	29458	79	-29379

For **Stewart County**, table 2 shows that the 2021 annual emissions from TVA-Cumberland Power Station increased from the 2020 emissions by 588 tons and are less than any of the years during the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 5,310 tpy between the modeled 2012-2014 period and the latest 2019-2021 period as shown in table 4, therefore no additional modeling analysis is needed. The two coal-fired boilers are potentially slated for retirement in 2026/2028 and be replaced with combined-cycle gas plant for electric power generation.

For **Humphreys County**, table 2 shows that the 2021 annual emissions from TVA-Johnsonville Power Station significantly decreased from the 2017 levels due to the retirement and shut down of the coal-fired boilers in 2018. Units five through ten at this plant were retired prior to 2017, and the remaining units one through four were retired by the end of 2017. The 2021 emissions are less than any of the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 38,698 tpy between the modeled 2012-2014 period and the latest 2019-2021 period as shown in table 4, therefore, based on the shutdown of the coal-fired boilers and the conversion to a combined cycle power plant with mainly gas-fired combustion turbines, an exemption modeling demonstration from annual reporting of emissions is provided below for this facility.

For **Shelby County**, table 2 shows that the 2021 annual emissions from TVA-Allen Power Station are significantly less than the 2018 emissions due to the retirement and shut down of the three coal-fired boilers in the second quarter of 2018. The 2021 emissions are less than any of the 3-year period that were included in the initial DRR modeling (i.e., 2012-2014) as shown in table 3. Additionally, there is a total SO2 emissions reduction of 29,379 tpy between the modeled 2012-2014 period and the latest 2019-2021 period as shown in table 4, therefore, based on the shutdown of the coal-fired boilers and the conversion to a combined cycle power plant with mainly gas-fired combustion turbines, an exemption modeling demonstration from annual reporting of emissions is provided below for this facility.

3.0 PUBLIC INSPECTION PERIOD

As required in 40 CFR 51.1205, TDEC APC has made this report as an appendix to its Annual Monitoring Network Plan.

4.0 Exemption Modeling Demonstration from Annual Reporting of Emissions for TVA-Allen and TVA-Johnsonville

4.1 INTRODUCTION

This updated modeling incorporates the latest version of AERMOD (version 22112) and AERMET (version 22112) in assessing the latest 2019-2021 actual emission modeling for the following TN DRR sources:

TVA-Allen (ALF) - (source no. 79-0528).

TVA-Johnsonville (JOF) - (source no. 43-0011).

4.2 Background SO_2 Ambient Air Quality Data: The ambient annual natural background SO_2 concentrations that were used from the applicable monitoring sites in the original DRR modeling have been updated to the latest 2019-2021 design values for each modeled DRR source as shown in Table 5.

Table 5: Background SO_2 Ambient Air Quality Data

Source	State	Site ID	99th percentile SO_2 (1-hour) Concentration (ppb)			
			2019	2020	2021	2019-2021 DV
TVA-ALF	Tennessee	47-157-0075 (1)	2	2	2	2
TVA-JOF	Kentucky	21-061-0501 (2)	2	2	3	2

NOTE:

(1) Shelby Farms Nucor Monitoring Site in Memphis, TN.

(2) Mammoth Cave NP Monitoring Site in Edmonson County, KY.

4.3 TVA Modeled SO_2 Emissions: The latest 2019-2021 actual point source hourly SO_2 emissions for the two TVA DRR sources have been used in the updated modeling demonstrations as shown in Table 6.

Table 6: TVA Modeled Actual SO_2 Emissions in Pounds/Hour

Year	TVA-Allen	TVA-Johnsonville
2019	8.86	11.58
2020	20.02	16.76
2021	11.06	14.15
2019-2021 AVG.	13.3	14.2

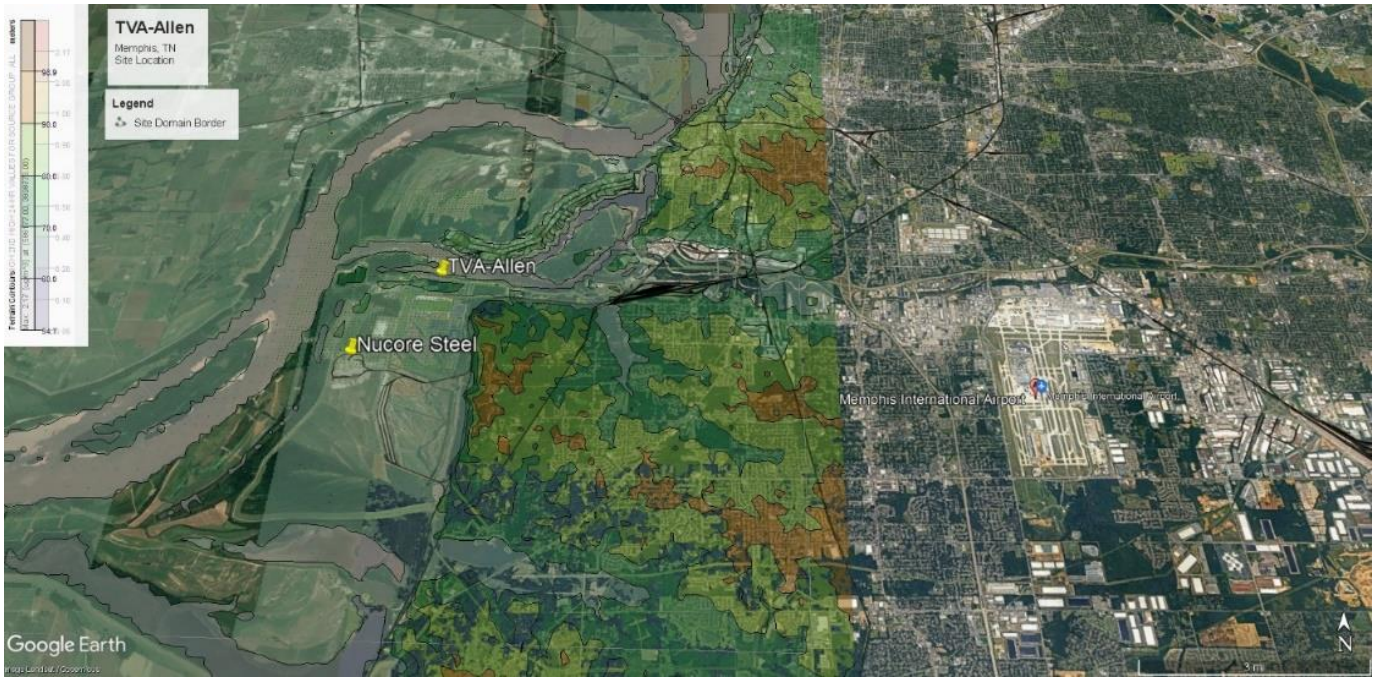
4.4 SO_2 Modeling Demonstrations:

4.4.1 TVA-Allen Modeling Demonstration

The updated modeling demonstration for TVA-Allen combined cycle power plant (Figure 1) consists of 20 combustion turbines and 4 units utilized for base load and peak load (heat recovery steam generator, HRSG) operations in addition to 2 emission points from the nearby Nucor Steel facility in Memphis as shown in Figure 2.

Figure 1: TVA-Allen site location

Figure 2: TVA-Allen site location relative to Nucor Steel and Memphis International Airport



4.1.1 TVA-Allen Modeled Sources

The modeled emissions and stack parameters for TVA-Allen and the nearby Nucor Steel plant in Memphis are shown in Table 4. The TVA-Allen emissions are the actual hourly 2019-2021 emissions. Allowable emissions were used for the Nucor Steel facility. All emissions data are enclosed in electronic format.

Table 7: TVA-Allen Modeled Sources and their Stack Parameters

Type	ID	Base_Elev	Height	Diam	Exit_Vel	Exit_Temp	Release_Type	Emission_Rate	Emission_Rate	X1	Y1
		[m]	[m]	[m]	[m/s]	[K]		grams/sec	lb/hr	[m]	[m]
POINT	ALF01	56.76	121.92	3.87	0	0	VERTICAL	0	0	759929.00	3884991.00
POINT	ALF02	56.69	121.92	3.87	0	0	VERTICAL	0	0	759983.00	3884988.00
POINT	ALF03	56.51	121.92	3.87	0	0	VERTICAL	0	0	760030.00	3884985.00
POINT	ACT01	72.97	15.85	5.70	0	0	VERTICAL	ACT	ACT	760258.80	3884765.70
POINT	ACT02	73.01	15.85	5.70	0	0	VERTICAL	ACT	ACT	760266.30	3884765.20
POINT	ACT03	73.08	15.85	5.70	0	0	VERTICAL	ACT	ACT	760277.50	3884764.50
POINT	ACT04	73.06	15.85	5.70	0	0	VERTICAL	ACT	ACT	760285.00	3884764.00
POINT	ACT05	73.03	15.85	5.70	0	0	VERTICAL	ACT	ACT	760296.20	3884763.30
POINT	ACT06	73.08	15.85	5.70	0	0	VERTICAL	ACT	ACT	760303.70	3884762.80
POINT	ACT07	73.69	15.85	5.70	0	0	VERTICAL	ACT	ACT	760314.90	3884762.00
POINT	ACT08	74.12	15.85	5.70	0	0	VERTICAL	ACT	ACT	760322.40	3884761.60
POINT	ACT09	74.76	15.85	5.70	0	0	VERTICAL	ACT	ACT	760333.70	3884760.80
POINT	ACT10	75.2	15.85	5.70	0	0	VERTICAL	ACT	ACT	760341.10	3884760.30
POINT	ACT11	75.94	15.85	5.70	0	0	VERTICAL	ACT	ACT	760352.40	3884759.60
POINT	ACT12	75.86	15.85	5.70	0	0	VERTICAL	ACT	ACT	760359.80	3884759.10
POINT	ACT13	75.59	15.85	5.70	0	0	VERTICAL	ACT	ACT	760371.10	3884758.40
POINT	ACT14	75.42	15.85	5.70	0	0	VERTICAL	ACT	ACT	760378.50	3884757.90
POINT	ACT15	74.98	15.85	5.70	0	0	VERTICAL	ACT	ACT	760389.80	3884757.20
POINT	ACT16	74.66	15.85	5.70	0	0	VERTICAL	ACT	ACT	760397.20	3884756.70
POINT	ACT17	74.47	9.60	8.28	0	0	VERTICAL	ACT	ACT	760434.10	3884764.40
POINT	ACT18	74.62	9.60	8.28	0	0	VERTICAL	ACT	ACT	760439.90	3884764.00
POINT	ACT19	74.74	9.60	8.28	0	0	VERTICAL	ACT	ACT	760480.10	3884761.40
POINT	ACT20	74.64	9.60	8.28	0	0	VERTICAL	ACT	ACT	760485.90	3884761.00
POINT	ACC1_BY	65.69	12.16	6.71	0	0	VERTICAL	ACT	ACT	760281.00	3884231.00
POINT	ACC2_BY	65.27	39.90	6.71	0	0	VERTICAL	ACT	ACT	760278.00	3884185.00
POINT	ACC1_HG	65.68	53.30	6.71	0	0	VERTICAL	ACT	ACT	760344.00	3884227.00
POINT	ACC2_HG	65.31	53.30	6.71	0	0	VERTICAL	ACT	ACT	760341.00	3884181.00
POINT	NUCOREAF	66.64	52.73	6.10	18.96	377.59	VERTICAL	17.04	135.24	758499.80	3882094.80
POINT	NUCORVTD	65.36	42.67	0.30	20.12	1272.04	VERTICAL	0.126	1.00	758599.50	3882119.80
							Total Nucore EMS =>	17.166	136.24		

4.4.2 TVA-Allen Modeling Results

Table 8 lists the modeled results (for 10-km modeling domain) and the source contributions (MAXDCONT) to the max design value (DV) in time and space.

Table 8: TVA-Allen Modeling Results

Modeled Source	Modeled Emission Rates (lb/hr)			Max. Overall DV Impact		Source Contribution to max DV Impact						Max DV Impact less than 50% of the NAAQS? (< 37.5 ppb)
	TVA-Allen	Nucor Steel	Total			TVA-Allen		Nucor Steel		Background		
				µg/m³	ppb	µg/m³	ppb	µg/m³	ppb	µg/m³	ppb	
ALL	13.3	136.2	149.5	17.1	**6.53**	0.00118	0.00045	11.842	4.52	5.24	2	**Yes**

As shown above, the overall impact is way below the 50% of the SO2 hourly NAAQS exemption threshold. The modeling result concentration isopleths and Google-Earth projection plot are shown in Figures 2 and 3. All modeling data are enclosed in electronic format.

Figure 3: TVA-Allen 1-Hour SO_2 Modeling Impact - Concentration Isopleth Results -AERMOD Model Plot

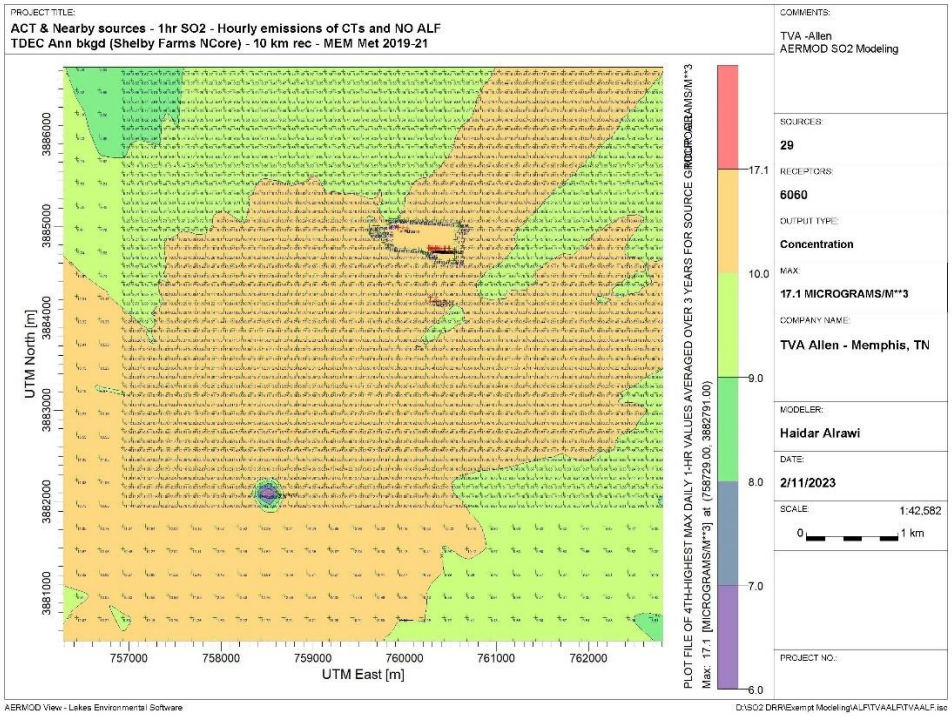


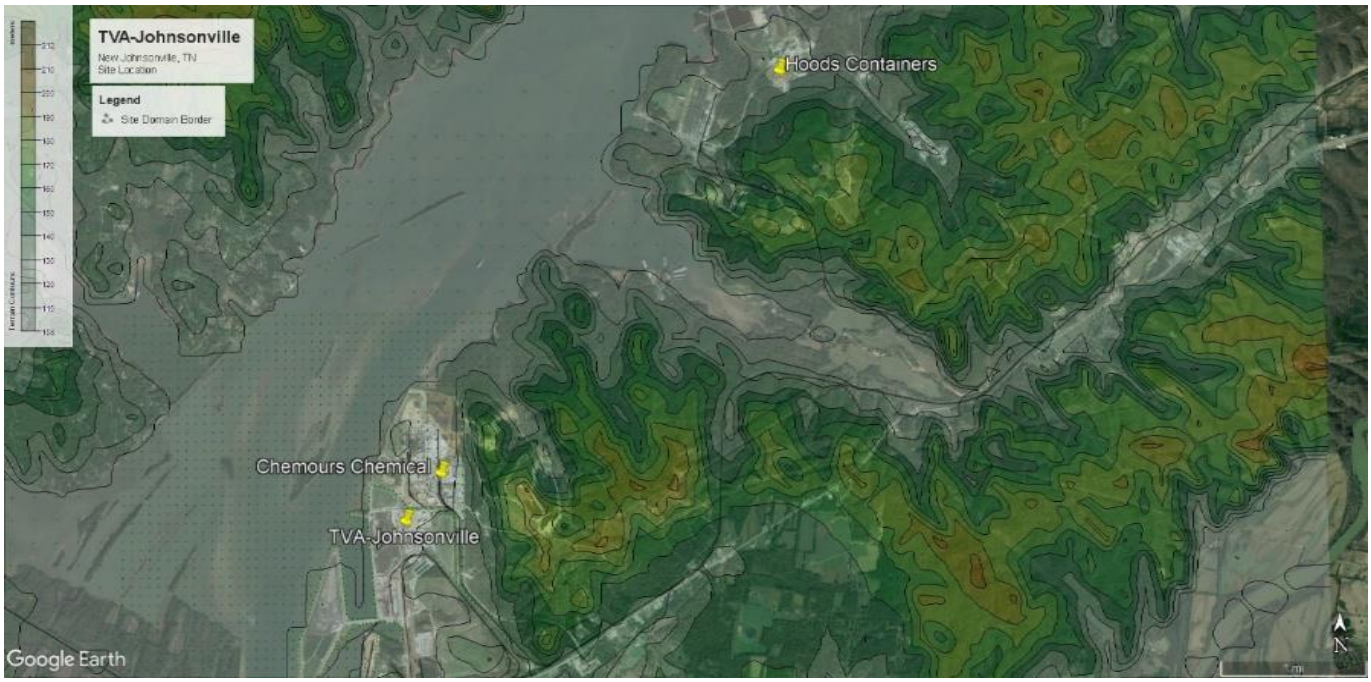
Figure 4: TVA-Allen 1-Hour SO_2 Modeling Impact - Concentration Isopleth Results -Google Earth Plot

4.5 TVA-Johnsonville Modeling Demonstration

The updated modeling demonstration for TVA-Johnsonville combined cycle power plant (Figure 5) consists of 20 combustion turbines in addition to 18 emission points from the nearby Chemours Chemical facility (formerly DuPont) and 7 emission units from the nearby Hood Containers facility as shown in Figure 6.

Figure 5: TVA-Johnsonville site location

Figure 6: TVA-Johnsonville site location relative to Chemours Chemical and Hood Containers



4.5.1 TVA-Johnsonville Modeled Sources

The updated modeled emissions and stack parameters for TVA-Johnsonville and the nearby Chemours Chemical and Hood Container sources are shown in Table 9. The TVA-Johnsonville emissions are the actual hourly 2019-2021 emissions. The modeled emissions from the nearby sources represent the 3-year average of the actual 2019-2021 emissions from the reported 2019-2021 NEI data. All emissions data are enclosed in electronic format.

Table 9: TVA-Johnsonville Modeled Sources and their Stack Parameters

Type	ID	Base_Elev	Height	Diam	Exit_Vel	Exit_Temp	Release_Type	Emission_Rate	Emission_Rate	X1	Y1
		[m]	[m]	[m]	[m/s]	[K]		grams/sec	lb/hr	[m]	[m]
POINT	JOF	117.21	182.88	9.80	0.00	0.00	VERTICAL	0.000000	0.000000	411194.00	3987702.00
POINT	JCT01	118.29	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411278.50	3988466.40
POINT	JCT02	118.29	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411288.40	3988439.90
POINT	JCT03	118.25	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411303.20	3988399.20
POINT	JCT04	118.24	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411313.00	3988372.80
POINT	JCT05	118.31	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411316.50	3988327.80
POINT	JCT06	118.44	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411326.30	3988301.50
POINT	JCT07	118.26	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411341.50	3988260.70
POINT	JCT08	118.50	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411350.10	3988237.10
POINT	JCT09	118.39	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411354.10	3988193.90
POINT	JCT10	118.33	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411364.40	3988166.70
POINT	JCT11	118.21	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411379.20	3988127.10
POINT	JCT12	118.32	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411389.40	3988099.80
POINT	JCT13	118.25	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411463.40	3988127.60
POINT	JCT14	118.28	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411453.10	3988154.80
POINT	JCT15	118.29	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411438.30	3988194.40
POINT	JCT16	118.30	9.75	3.70	0.00	0.00	VERTICAL	ACT	ACT	411428.10	3988221.70
POINT	JCT17	118.29	17.10	4.28	0.00	0.00	VERTICAL	ACT	ACT	411386.80	3988393.80
POINT	JCT18	118.46	17.10	4.28	0.00	0.00	VERTICAL	ACT	ACT	411375.00	3988425.20
POINT	JCT19	118.23	17.10	4.28	0.00	0.00	VERTICAL	ACT	ACT	411363.10	3988457.30
POINT	JCT20	118.29	17.10	4.28	0.00	0.00	VERTICAL	ACT	ACT	411351.10	3988489.60
POINT	CHEMR70	118.56	36.59	0.91	4.27	449.82	VERTICAL	0.000384	0.003044	411718.20	3988829.30
POINT	CHEMR71	118.56	32.93	1.01	7.62	449.82	VERTICAL	0.000575	0.004566	411718.20	3988829.30
POINT	CHEMR32	118.56	44.20	3.35	5.00	399.26	VERTICAL	0.003452	0.027397	411718.20	3988829.30
POINT	CHEMR33	118.56	44.21	3.35	5.49	404.26	VERTICAL	0.003740	0.029680	411718.20	3988829.30
POINT	CHEMR63	118.56	44.21	1.52	23.78	412.04	VERTICAL	0.002301	0.018265	411718.20	3988829.30
POINT	CHEMR08	118.56	77.74	0.37	36.89	308.15	VERTICAL	0.457205	3.628615	411718.20	3988829.30
POINT	CHEMR09	118.56	76.22	0.37	49.09	308.15	VERTICAL	0.454712	3.608828	411718.20	3988829.30
POINT	CHEMR11A	109.41	21.34	0.30	28.96	335.93	VERTICAL	0.018603	0.147641	411729.20	3989938.30
POINT	CHEMR11C	118.56	21.34	0.49	33.84	335.93	VERTICAL	0.004027	0.031963	411718.20	3988829.30
POINT	CHEMR05	118.56	21.95	1.07	20.09	329.26	VERTICAL	0.702110	5.572298	411718.20	3988829.30
POINT	CHEM13B	118.56	27.22	0.79	10.06	449.82	VERTICAL	0.000767	0.006088	411718.20	3988829.30
POINT	CHEMR13A	118.56	29.42	0.70	6.10	449.82	VERTICAL	0.000384	0.003044	411718.20	3988829.30
POINT	CHEMR64	118.56	14.02	0.50	16.46	390.37	VERTICAL	0.000005	0.000038	411718.20	3988829.30
POINT	CHEMR120	118.56	2.50	0.30	10.18	854.26	CAPPED	0.000073	0.000578	411718.20	3988829.30
POINT	CHEMR89	118.56	1.07	0.06	57.32	810.93	CAPPED	0.000001	0.000009	411718.20	3988829.30
POINT	CHEMR84	118.56	4.57	0.30	47.26	677.04	CAPPED	0.000770	0.006111	411718.20	3988829.30
POINT	CHEMR81	118.56	2.44	0.60	41.46	677.04	HORIZONTAL	0.000018	0.000139	411718.20	3988829.30
POINT	CHEMR11B	118.56	21.34	0.30	28.96	335.93	VERTICAL	0.004219	0.033486	411718.20	3988829.30
POINT	HOOD5100	136.81	36.89	2.74	10.37	435.93	VERTICAL	0.001166	0.009253	415563.40	3993306.30
POINT	HOOD2010	136.81	23.17	0.30	10.67	312.04	VERTICAL	0.032924	0.261302	415563.40	3993306.30
POINT	HOOD2145	136.81	5.12	0.15	0.73	339.26	VERTICAL	0.007872	0.062478	415563.40	3993306.30
POINT	HOOD2140	136.81	5.15	0.15	5.12	360.37	VERTICAL	0.007872	0.062478	415563.40	3993306.30
POINT	HOOD5000	136.81	39.63	3.26	10.06	338.15	VERTICAL	9.690000	76.904762	415563.40	3993306.30
POINT	HOOD213A	136.81	22.20	0.91	43.10	314.82	VERTICAL	0.005511	0.043742	415563.40	3993306.30
POINT	HOOD213B	136.81	22.20	0.91	43.10	314.82	VERTICAL	0.005511	0.043742	415563.40	3993306.30
							Total Chemours EMS=>	1.65	13.12		
							Total Hood EMS=>	9.75	77.39		

Following our discussion with EPA R4 on April 13, 2023, on the appropriate emissions to be modeled for the two nearby facilities (Chemours and Hood) significant emissions sources (i.e., 3 sources from the Chemours Chemical facility and 1 source from the Hood Container facility) as shown in Table 10. For the other modeled minor sources for both facilities, we agreed that their emissions would remain the same as the 3-year averaged actual NEI emissions. Considering this, the following is our modeling assessment based on the latest emissions testing results

for the Chemours facility (ore roasters and reaction chlorinator) and the Hood container (wood waste boiler). This boiler is controlled with a wet scrubber and has CEMs requirement, and they don't report the data except when they have excess emissions. The CEM RATA is required on an annual basis. Subsequently, we have updated the SO2 emissions from this source and used 76.94 lb/hr based on the highest emissions factor from the latest (2022) CEM RATA verification report (submitted electronic emissions data) as shown in the table 10 below.

Table 10: TVA-Johnsonville Updated Emissions for Nearby Sources

Facility	Emission Source Number	Emission Source Name	Stack ID	Modeled SO2 Emissions (lb/hr)	Updated SO2 Emissions (lb/hr)	Stack Test SO2 Emissions (lb/hr)	Emissions BASIS
Chemours Chemical	5	Ore Roasters	CHEMR05	5.57	No Change	5.11	Emissions Testing
Chemours Chemical	8	L1 Reaction Chlorinator	CHEMR08	3.63	No Change	0.54	Emissions Testing for L2
Chemours Chemical	9	L2 Reaction Chlorinator	CHEMR09	3.63	No Change	0.54	Stack Testing for L2
		(L1 and L2 are identical)					
Hood Container	7	Waste Wood Boiler (527 mmBtu/hr)	HOOD5000	4.85	76.94		CEM RATA highest EF of 0.146 lb/mmBtu

There are no changes for SO2 emissions from the 3 Chemours significant sources because we initially modeled at a higher rate than what is reported in the submitted emissions testing data files. The only change is increasing the emissions for the Hood wood waste boiler from 4.85 lb/hr (NEI) to 76.94 lb/hr (CEM RATA). Based on this updated modeling, the overall DV impact for TVA-JOF modeling is the same as before at 36.1 ppb and the only change is that the source contribution to the DV went from zero initially to 0.00129 ppb for the Hood Container facility (as shown in the updated MAXDCONT spreadsheet file) as this facility is located quite a distance north of the TVA-Johnsonville and has an insignificant impact to the overall modeled DV.

4.5.2 TVA-Johnsonville Modeling Results

Table 11 lists the modeled results (for 10-km modeling domain) and the source contributions (MAXDCONT) to the max design value (DV) in time and space.

Table 11: TVA-Johnsonville Modeling Results

Modeled Source	Modeled Emission Rates (lb/hr)				Max. Overall DV Impact		Source Contribution to max DV Impact						Max DV Impact less than 50% of the NAAQS? (< 37.5 ppb)
	TVA-JOF	Chemours	Hood	Total			TVA-JOF		Chemours		Background		
					µg/m³	ppb	µg/m³	ppb	µg/m³	ppb	µg/m³	ppb	
ALL	14.2	13.1	77.4	104.7	94.58	**36.1**	0.00121	0.00046	89.34	34.1	5.24	2	**Yes**

As shown above, the overall impact is way below the 50% of the SO2 hourly NAAQS exemption threshold. The modeling result concentration isopleths and Google-Earth projection plot are shown in Figures 2 and 3. All modeling data are enclosed in electronic format.

Figure 7: TVA-Johnsonville 1-Hour SO_2 Modeling Impact - Concentration Isopleth Results -AERMOD Model Plot

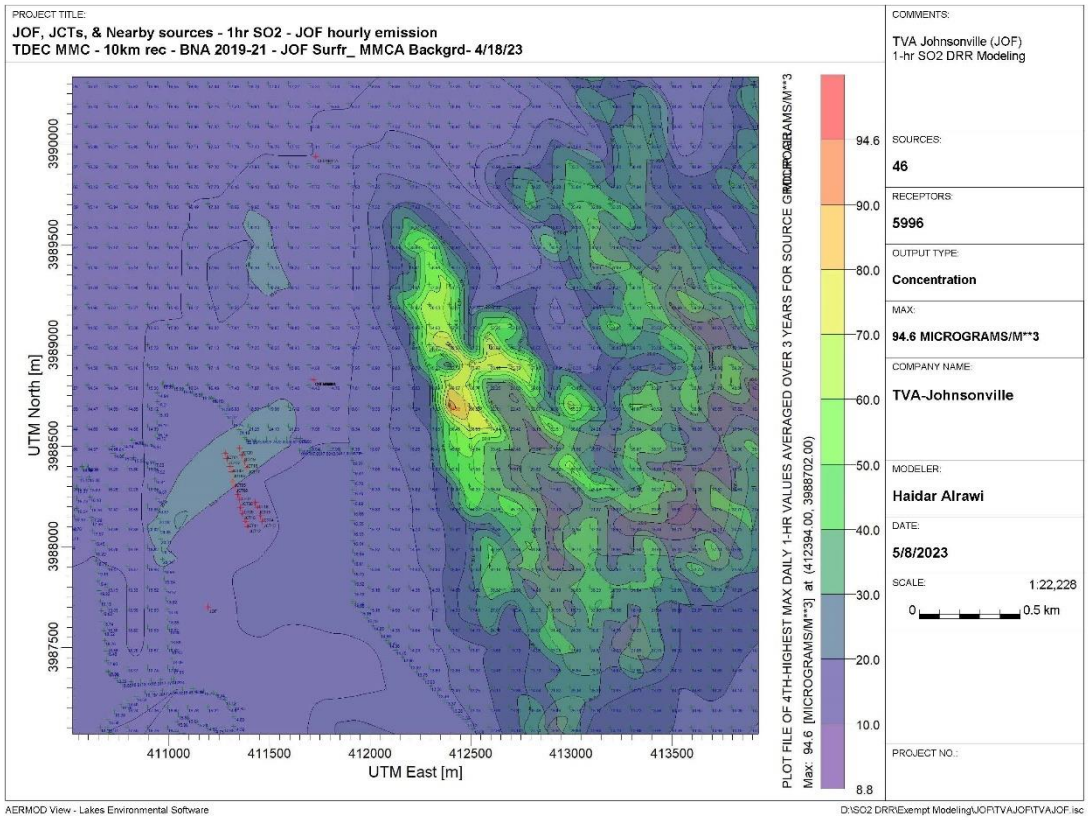
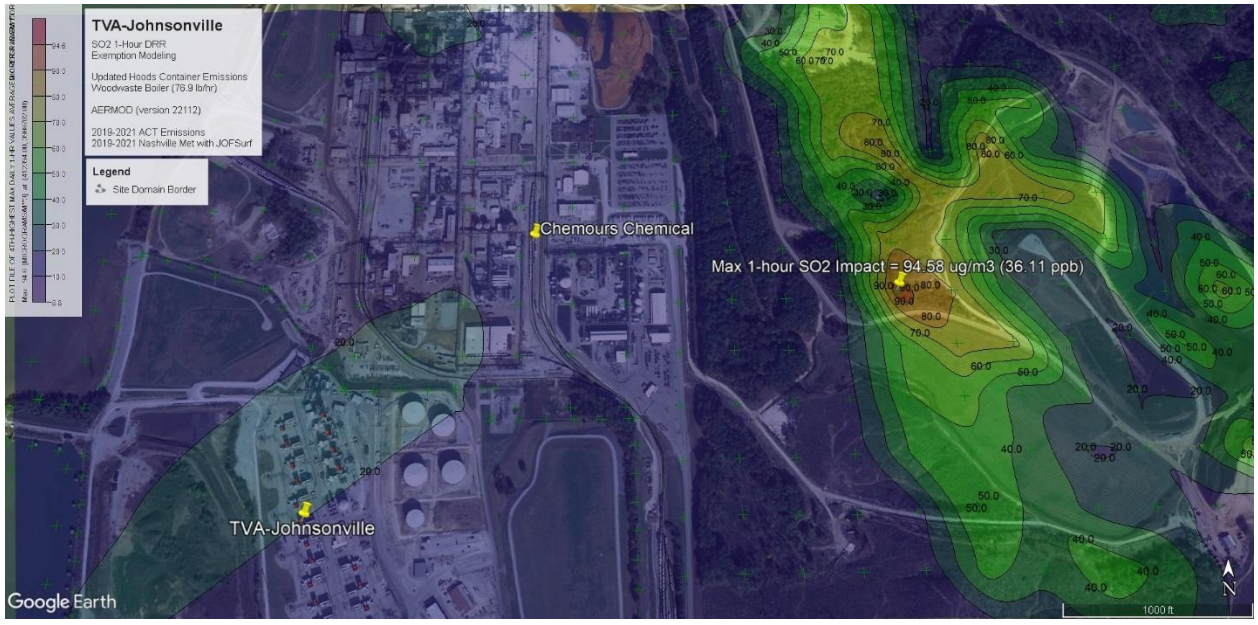


Figure 8: TVA-Johnsonville 1-Hour SO_2 Modeling Impact-Concentration Isopleth Results-Google Earth Plot



5.0 CONCLUSIONS

This submittal satisfies the DRR annual reporting and verification of emissions for the year 2022 as demonstrated with the latest 2019-2021 emissions for the TVA DRR sources in TN. Namely: TVA-Allen, TVA-Johnsonville, and TVA-Cumberland.

Tennessee has also demonstrated through the latest 2019-2021 modeling for TVA-Allen and TVA-Johnsonville that both power plants qualify for exemption from the ongoing annual reporting of emissions based on the DV modeling results that are below 50% of the SO2 hourly NAAQS.

The State of Tennessee is meeting its obligations regarding the SO_2 emissions of the DRR sources and the impacted counties and hereby requests that both TVA-Allen and TVA-Johnsonville be exempted from further reporting of actual emissions under the DRR rule as the coal-fired boilers (ALF and JOF) at these plants had been retired and shutdown.

The TVA-Cumberland is potentially salted for shutdown and retirement of the two coal-fired power boilers in 2026/2028 and conversion of the plant to a combined-cycle gas-fired power plant utilizing mainly gas-fired combustion turbines (CTs), which is same as TVA-Allen (now ACT) and TVA-Johnsonville (now JCT) and potentially be exempted from annual reporting of emissions in the foreseeable future.